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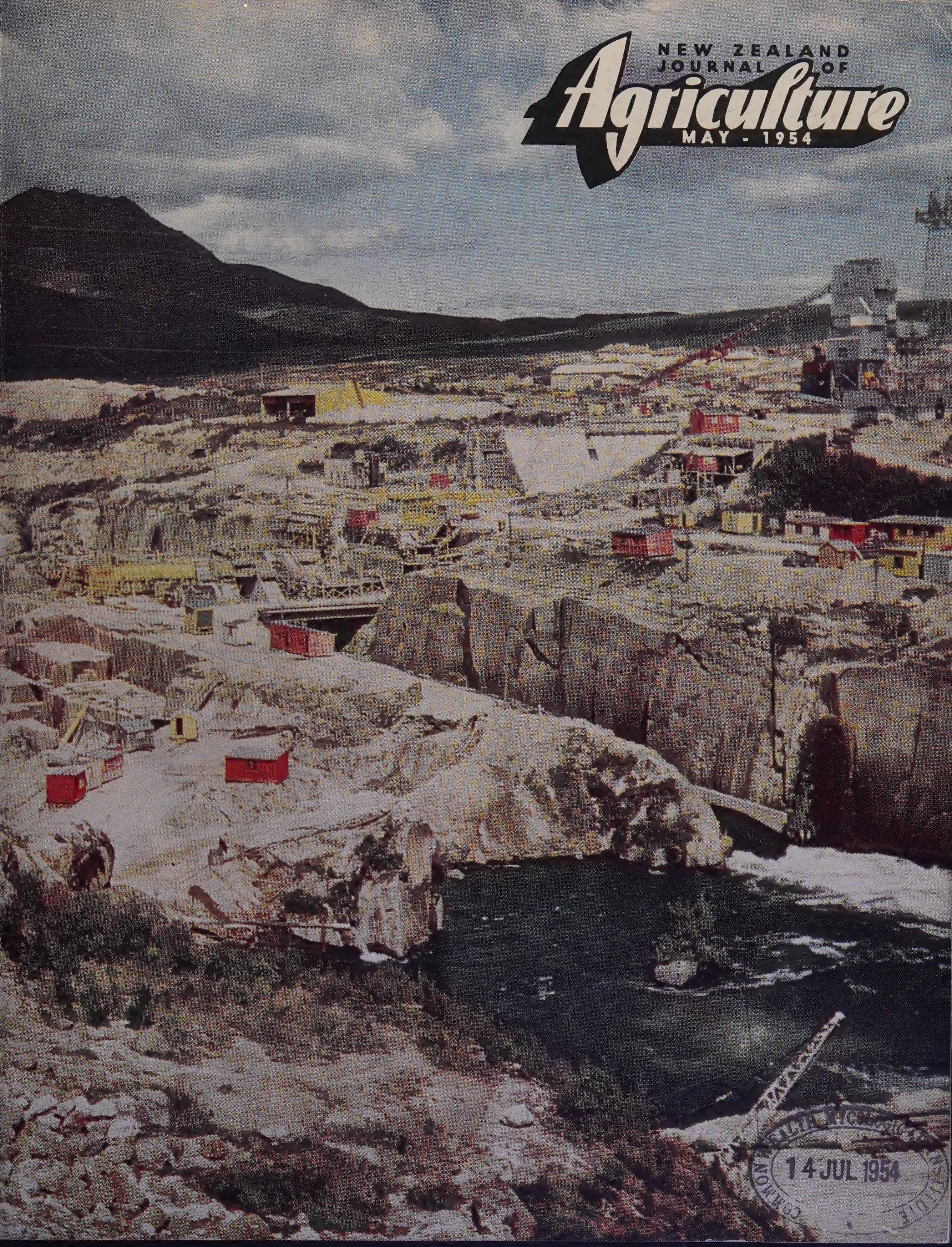

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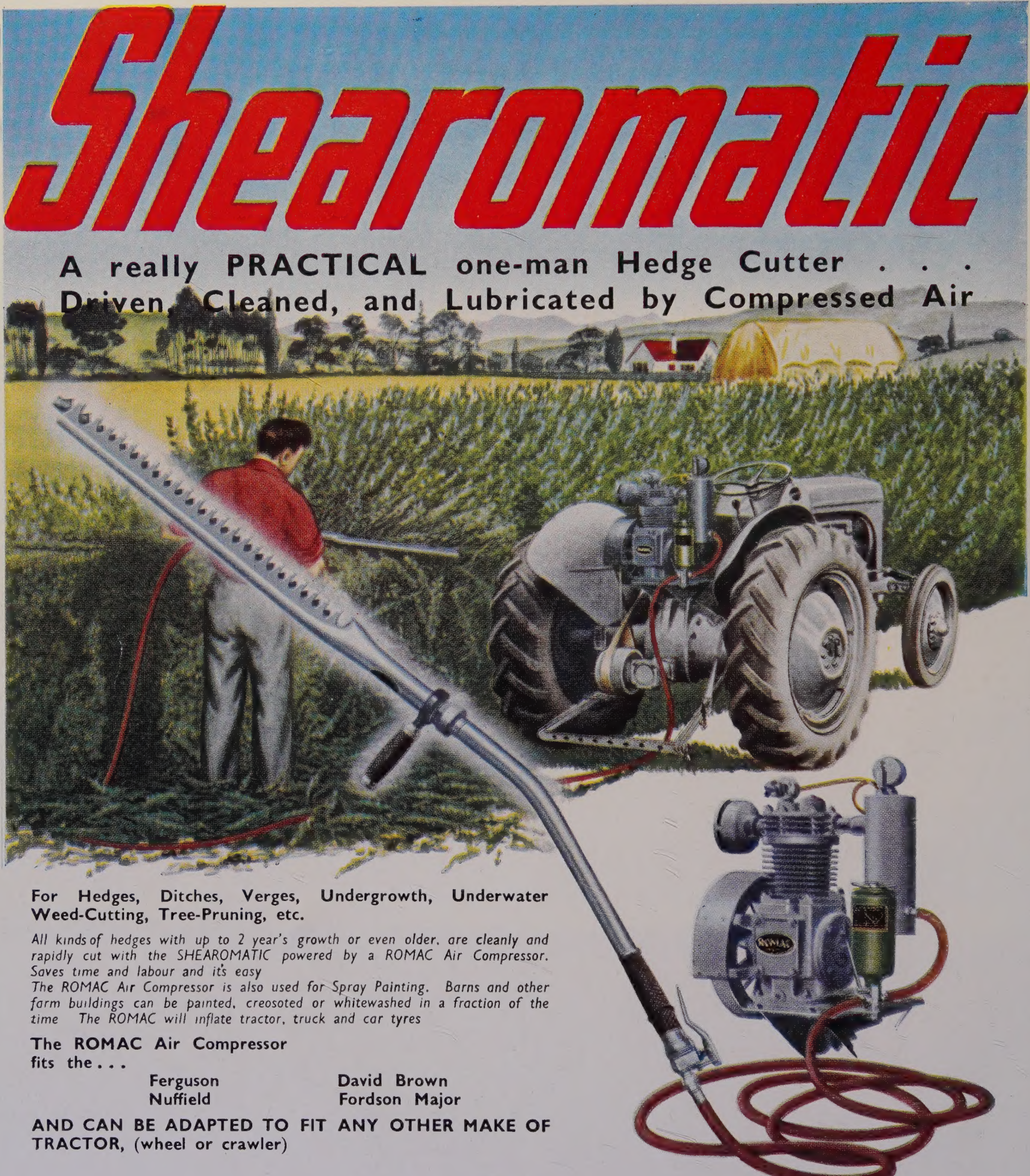

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This Month's Cover

Constructional work on the Whakamaru dam and hydro-electric generating station on the Waikato River is the subject of this month's cover, which is reproduced from a colour photograph by D. R. Brenchley. At this point the Waikato flows through the heart of the pumice country of the Central Plateau of the North Island. The remarkable agricultural and industrial developments in this area are described in an article in this issue. Some of the large-scale improvement and grassing of pumice lands is evident in the background of the cover illustration.

TABLE OF CONTENTS

Pumice Land Development in Central North Island	P. W. Smallfield ..	419
Winter Show Dates	.. .. ..	422
Fifth Laying Trial of Prospective Poultry Breeding Stock	F. C. Bobby ..	423
The Home Orchard in Winter	C. E. K. Fuller ..	427
Elevated Bail Sheds for Stoopless Milking ..	W. G. Batt ..	433
Farm Schools in Bay of Plenty	G. J. Neale ..	436
Specialised Small Seed Production on Marlborough Farm	W. R. Crawford ..	449
The Care of Belts	.. .. ..	458
Radio Broadcasts	.. .. ..	460
Care of Livestock during June	.. .. ..	461
Dairy Produce Graded for Export	.. .. ..	461
Pasture Management and Topdressing (Seasonal Notes)	.. .. ..	463
Avoidable Losses in Handling of Meat Animals	D. H. Le Souef ..	465
Accidents with Drilling Machines	.. .. ..	466
Land Improvement: Drainage of Swamp Land in Waimarino County	A. A. Duncan ..	467
Checking Efficiency of Milking Machines ..	W. G. Batt ..	468
Ropes, Knots, and Splices for Farm Use ..	M. J. Campbell ..	469
Recent Research Work: Fertilisers	.. .. ..	479
Good Rearing of Dairy Stock	C. P. McMeekan ..	481
Honey House Construction and Layout of Plant	L. H. Johnson ..	486
Turkeys and Geese a Profitable Sideline (Household Poultry Keeping)	H. K. Mullins ..	489
Meteorological Records for March	.. .. ..	490
The Home Garden	C. L. Napier and S. O. Gillard ..	491
Pig Housing: Housing for Whey Feeding Piggeries	A. Longwill ..	499
The Flower Garden	M. J. Lockie and B. F. A. Rough ..	504
Designed Flower Arrangement	Margaret O'Brien ..	513
Deep Fat Frying	Maud B. Strain ..	519
A Steamed Pudding with Variations	Nell Macpherson ..	525
Seams and Seam Finishes	Daphne Eilers ..	527

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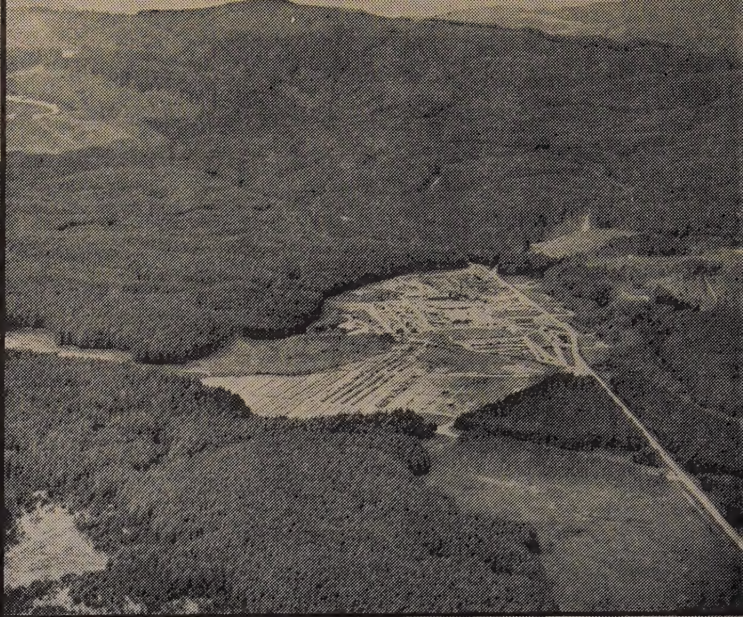
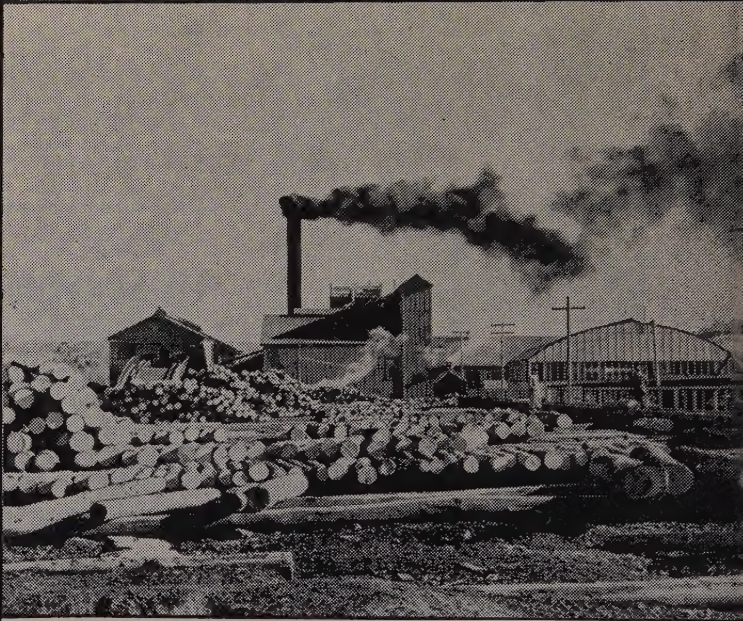
PUMICE LAND DEVELOPMENT





"In the late 1920s there arose a great controversy on the opposing claims of forestry and farming for the pumice lands." Upper left—Land development on the Mihi Block. Upper right—New Zealand Forest Service sawmill near Rotorua. Middle left—Planting seedling *Pinus radiata* on Kaingaroa Plains. Middle right—Logs for sawn timber at a mill in the Waipa State Forest. Lower left—Pouakani Maori land development at Mangakino. Lower right—Heavy flanged roller used to crush scrub. All photos except that at lower right by National Publicity Studios.

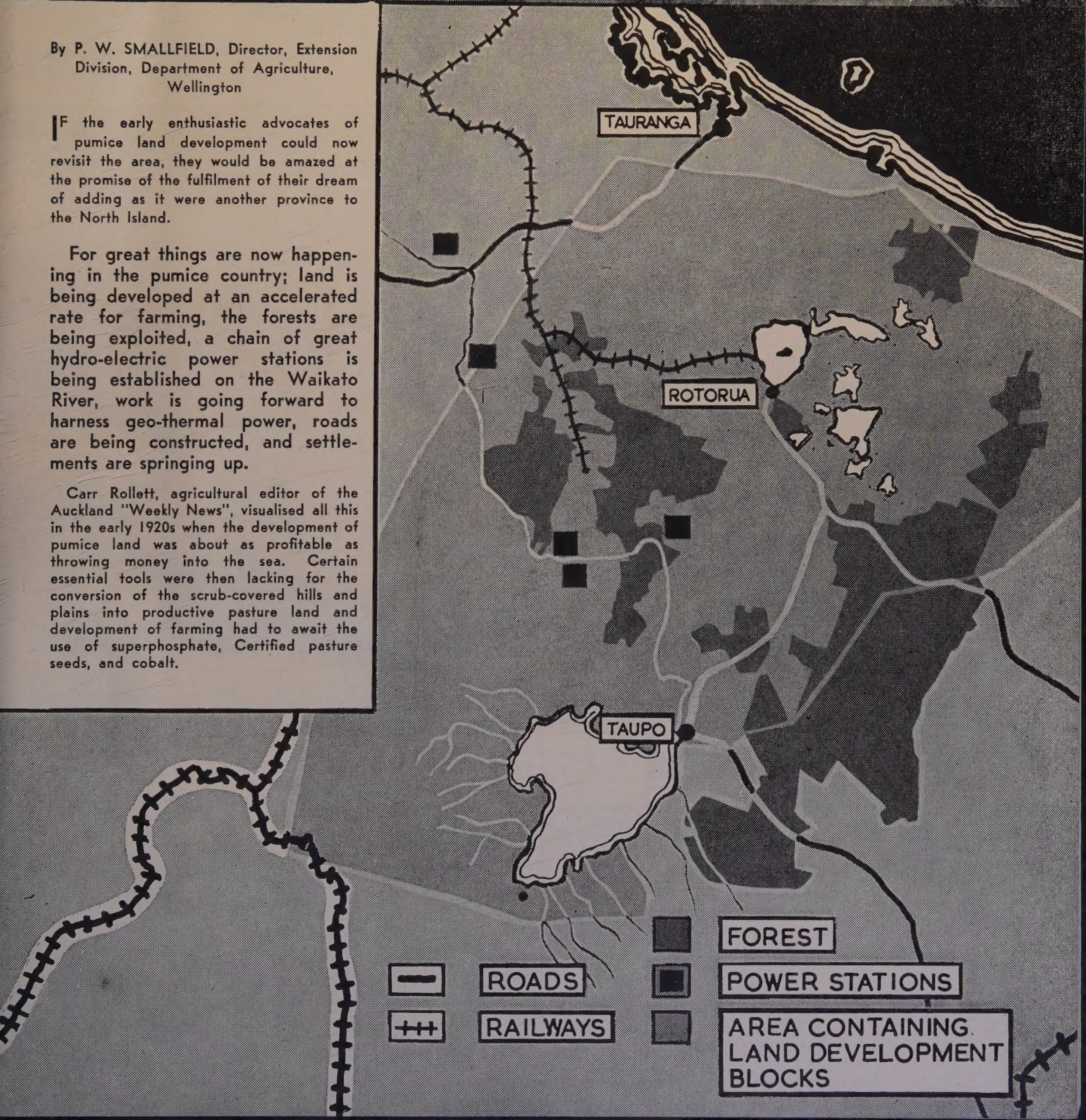
Pumice Land Development in Central North Island

By P. W. SMALLFIELD, Director, Extension Division, Department of Agriculture, Wellington

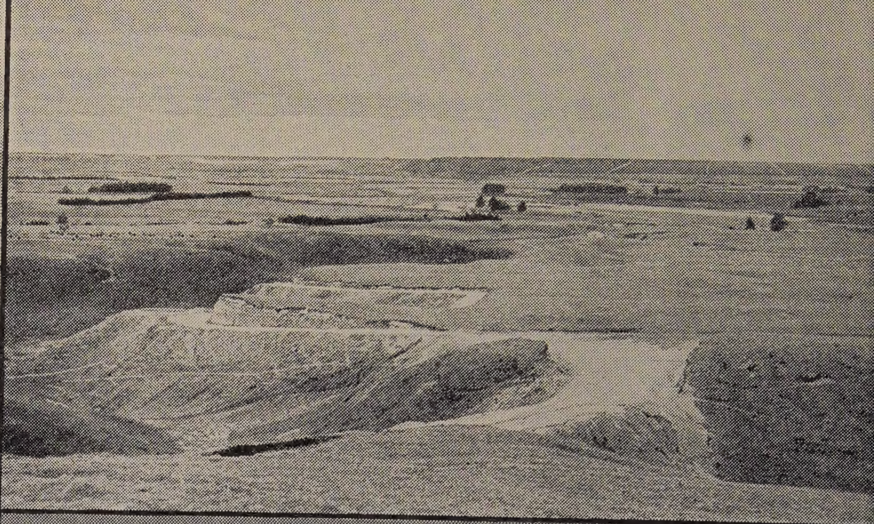
IF the early enthusiastic advocates of pumice land development could now revisit the area, they would be amazed at the promise of the fulfilment of their dream of adding as it were another province to the North Island.

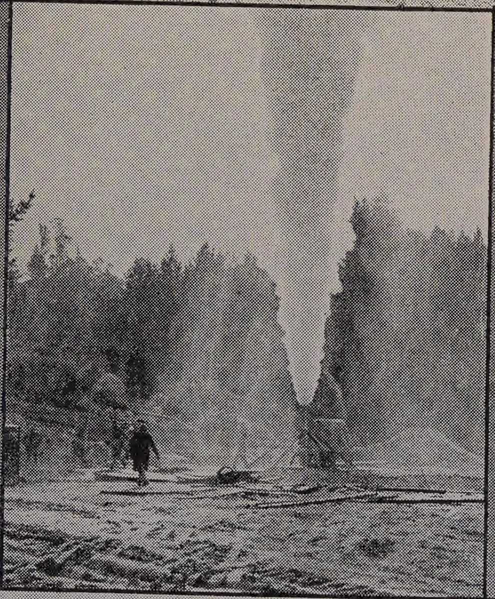
For great things are now happening in the pumice country; land is being developed at an accelerated rate for farming, the forests are being exploited, a chain of great hydro-electric power stations is being established on the Waikato River, work is going forward to harness geo-thermal power, roads are being constructed, and settlements are springing up.

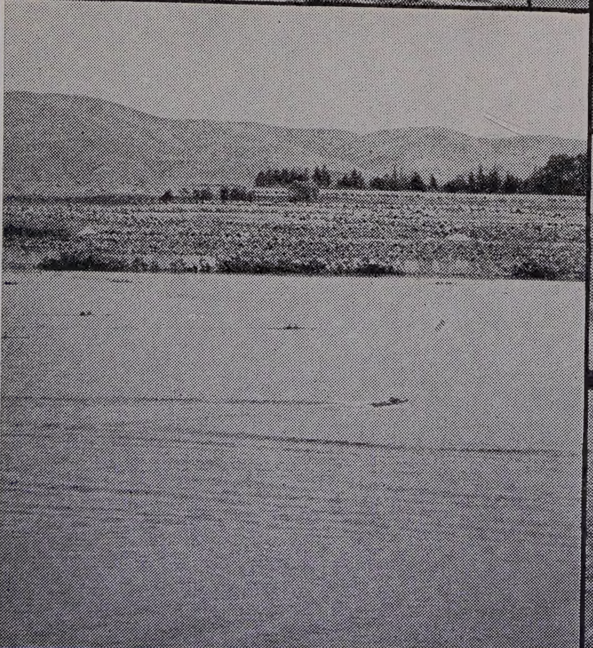
Carr Rollett, agricultural editor of the Auckland "Weekly News", visualised all this in the early 1920s when the development of pumice land was about as profitable as throwing money into the sea. Certain essential tools were then lacking for the conversion of the scrub-covered hills and plains into productive pasture land and development of farming had to await the use of superphosphate, Certified pasture seeds, and cobalt.



PUMICE LAND DEVELOPMENT







Central Volcanic Plateau

THE Central Volcanic Plateau forms the main watershed of the North Island. Commencing south of Lake Taupo, it stretches across the North Island from the main mountain range on the east to the elevated marine plain on the west and extends northwards as far as the Bay of Plenty. Relatively flat over wide areas, the plateau rises here and there into high volcanic cones, flat-topped hills, and serrated ridges. Rhyolite lava flows and large masses of pumice stone form the tableland, and the numerous volcanic cones that occur throughout its extent are built up of rhyolite, andesite, and partly also of basalt. Lake Taupo is surrounded with volcanic rocks which form a tableland from 2000ft. to 2200ft. above sea level and on which numerous volcanic peaks arise.

The Waikato River leaves Lake Taupo at the north-east end and shapes its course north-east for about 20 miles, flowing through a broad terraced valley on the boundary of the Kaingaroa Plains. After its junction with the Waiotapu River the Waikato makes a sharp turn to the west and flows in a deep gorge and emerges near Maungatautari in the broad plain of the Waikato. The Mokau River rises on the flanks of the Hauhangaroa Range and flows to the west coast, entering the sea about half-way between Kawhia Harbour and New Plymouth. The Waipa River has its source on the Rangitoto Range and joins the Waikato at Ngaruawahia. The Wanganui River rises on the Central Plateau at the foot of Mt. Tongariro and the Rangitaiki River, which enters the sea between Whakatane and Matata, rises in the mountains to the east of Lake Taupo and flows along the edge of the Kaingaroa Plains.

Bush Sickness

The great open tussock plains of the Central Plateau attracted attention in the 50s and 60s as a field for extensive pastoral farming, but except in the southern areas where the surface soil has been sprinkled with Ngauruhoe ash or in isolated areas where greywacke fans spread over the pumice flats, sheep farming failed because of bush sickness, which affected stock in the areas of the two major ash showers, Taupo and Kaharoa.

But even in the areas where bush sickness did not prevent sheep farming, the poor grazing afforded by the tussock pastures and the deterioration caused by fires and rabbits steadily decreased the importance of the area for sheep farming.

Illustrations opposite: Upper left—Trout fishing in the Waitahanui River mouth, Lake Taupo. Upper right—Land development, Mihi Block. Middle left—Geo-thermal steam bore in Wairakei Valley. Middle right—Well-developed dairy farm at Ngakuru. Lower left—Empire Games rowing event on Karapiro Lake in 1950. Lower right—Maori land development at Horohoro. All photographs except those at middle right and lower right by National Publicity Studios.

In the 70s and 80s farming pushed up toward the central region from the Bay of Plenty and the Waikato to meet again with the problem of bush sickness. Settlers could farm the bush-sick areas only from a base that was free from the trouble and the main bases for attack were safe areas in the Tirau-Matamata district, the coastal swamps of the Bay of Plenty, and the lake and river bottoms of Rotorua and the upper Waikato.

Forests or Farms?

Little progress was made in land development and large areas were diverted to forest plantings. Work commenced in the early 1900s and was accelerated in the 1920s with the exotic forest boom.

In the late 1920s there arose a great controversy on the opposing claims of forestry and farming for the pumice lands. The pumice land enthusiasts led by Earle Vaile, who bought large areas, and Carr Rollett claimed immense possibilities for the pumice land, but their critics replied that the land was bush sick and would not maintain a productive pasture.

After presentation of the report of the Parliamentary committee on the Rotorua-Taupo Railway, the State decided to take a hand in grassing pumice land. In 1930 the Department of Agriculture began work at Ngakuru and the Maori Affairs Department at Horohoro. Fortunately truly perennial strains of ryegrass seed were isolated and multiplied by this time by the Department of Agriculture and were available for the early large-scale grassing work.

The initial question to be decided was whether Certified perennial ryegrass would be permanent from initial sowings on pumice land if white clover growth could be stimulated sufficiently with phosphatic fertilisers. Instead of building up fertility through a series of temporary pastures, the pasture itself was made to build up a veneer of fertility. Thus a relatively cheap and successful method of grassing was obtained and the practices initiated at Ngakuru are now used generally for grassing most classes of ploughable scrub land.

The most recent achievement in pasture establishment has been work by the Department of Lands and Survey in grassing steep unploughable country after burning, the aeroplane being used for seed and fertiliser distribution with subsequent controlled heavy stocking to clear up natural vegetation and consolidate the pastures. This recent work has greatly widened the scope of pumice land development and promises to bring under pasture many thousands of acres which a few years ago would have been considered impossible.

Pumice Soils

The pumice soils derived from the various ash showers vary in texture and moisture-holding capacity and in their natural state look unattractive for farming.

The sandy silts from the Taupo and Mamaku showers, the sandy loams from Rotomahana mud, and the medium sands of the Kaharoa shower hold moisture fairly well and are capable of carrying productive swards of perennial ryegrass and white clover with adequate topdressing.

The Taupo shower was not uniform in texture and there are considerable areas of coarse-textured soils with fairly poor moisture-holding capacity but which are more suitable for sheep and cattle grazing than dairying.

In the river and stream valleys in the central area covered by the Taupo shower the recent terraces consist of water-sorted material and the soils contain varying quantities of pumice stone pebbles; where the pebbles are very thick fertility building under permanent pasture is not as rapid as on the sandy silts deposited from the air.

Virgin pumice soils are deficient in phosphates and nitrogen. They are not responsive to lime, and potash deficiency is not likely to show up until the land has been under farming for 10 or 20 years.

Superphosphate is the most efficient phosphatic fertiliser for pumice land and the usual fertiliser dressing for pastures is to sow with 3cwt. of superphosphate, topdress the young pasture again 4 to 6 months after sowing with a further 2 to 3cwt. per acre, and then topdress annually with 3cwt. of superphosphate.

Grassing Pumice Land

Before cultivation work can be started the tangled mass of manuka and manoao scrub requires clearing and burning. In large-scale land development operations the scrub is crushed with a heavy flanged roller which breaks and cuts the scrub and gives results similar to those obtained by hand cutting. Experience has shown that the most suitable cultivation on level and undulating land is to plough with a lea mouldboard plough about 5in. deep; leave fallow for 2 to 4 months to allow the furrow slices to close together, then roll on the furrow with the Cambridge roller; double disc and chain harrow to level the surface; roll before sowing seed and fertiliser and cover the seed with chain harrows, and finally roll. Working down of the seed-bed should not be so prolonged that the surface soil is allowed to dry out. The land should be rolled immediately before sowing and one very successful method is to sow the grass seed mixture from a box attached to the Cambridge roller.

The basis of a permanent pasture mixture for pumice land suitable for white clover should consist of Certified perennial ryegrass 25lb., cocksfoot 10lb., and white clover 2lb. per acre. For autumn sowings 5lb. of Italian ryegrass or 5lb. of short-rotation ryegrass may be added and where red clover (either cowgrass or Montgomery) is desired in permanent sowings 2lb. should be included. Red clover grows luxuriantly on pumice soils and it is a good fertility builder if controlled. The great danger from heavy sowings of red clover in permanent pasture mixtures is that its luxuriant growth may smother out ryegrass and white clover. The red clover growth must be controlled by heavy stocking.

Since cobalt became available to control bush sickness, pumice land pastures may be used for dairying and lamb, mutton, and beef production, and the development work undertaken in recent years and in the immediate future will add several hundred thousand acres of first-class pastures to New Zealand's farm lands. Experience has shown that during the second year of development permanent pastures on pumice land will produce in the vicinity of 100lb. of butterfat per acre, which will rise to 150lb. and over as the herd and land improve.

The information on specific developments which follows has been prepared from material supplied by the departments and organisations concerned.

Land Development by the State

Some of the most striking results in large-scale land development in the history of the conversion of New Zealand wastelands to productive farmlands have been and are being achieved by State Departments in the pumice country of the Rotorua-Taupo area. The Department of Lands and Survey has in the past few years brought into production over 100,000 acres of land and 20,000 acres of unimproved land are being sown to grass each year.

Department of Lands and Survey

The table below shows acreages under development or planned for development by the Land Development Branch of the Department of Lands and Survey in the Rotorua-Taupo and Te Kuiti areas.

Name of block	Location	Area
Rotorua		acres
Atiamuri	23 miles Rotorua	20,737
Edgecumbe	11 miles Edgecumbe	7,354
Fairview	5 miles Waimana	1,978
Galatea	5 miles Murapara	5,128
Mamaku	12 miles Rotorua	1,002
Maraetai	3 miles Murapara	36,800
Mihi	35 miles Rotorua	41,000
Oruanui	2 miles Wairakei	14,300
Oruanui South	2 miles Wairakei	23,000
Pikowai	3 miles Matata	22,000
Puaiti	Wairakei	22,000
Rerewhakaitu	32 miles Rotorua	28,000
Rotomahana	15 miles Rotorua	12,800
Royden Downs	10 miles Paengaroa	6,354
Tauhara	Taupo	17,500
Tirohanga	5 miles Whakamaru	16,350
Tokoroa	6 miles Tokoroa	5,201
Waikite	18 miles Rotorua	23,900
Waikora	45 miles Rotorua	3,756
Waimanu	9 miles Tauranga	2,188
Waiotapu	17 miles Rotorua	8,600
Wharere	Pongakawa	5,038
Te Kuiti		
Arohena	30 miles Te Awamutu	2,750
Huirimu	35 miles Te Awamutu	3,900
Ranginui	14 miles Mangapehi	20,300
Total		324,986

Total stock on the above areas as at 30 June 1953 were: Sheep, 128,516; cattle, 23,640; dairy stock, 4439.

Maori Affairs Department

During the past 25 years the Maori Affairs Department has developed large areas round Rotorua and southern Taupo. One of the more recent developments has been the Pouakani Maori Scheme, of 30,486 acres, near Mangakino, which was begun in 1947. To date 11,658 acres have been grassed and the 3208 acres settled comprises 18 farms, each carrying 60 to 70 dairy cows, and two training farms. An additional 6 farms are planned to be settled in July of this year. Stock on farms settled to date comprises 1000 dairy cows and 700 yearling heifers, and stock on the station for the block comprises 20,000 sheep (5000 ewes), 200 run heifers, 400 steers, and 42 bulls. There are 6000 acres of bush on the block; 1530 acres have been taken by the Ministry of Works, and 11,298 acres remain to be developed.

Exotic Forest Plantations

The New Zealand Forest Service has 275,000 acres of exotic forest in the Rotorua-Taupo area and another 267,000 acres are owned by private forestry, milling, and paper interests. On the Kaingaroa Plains there is a greater concentration of wood growth than on any other similar area in the world. Growing faster than any other soft woods in the world, the forests of the Rotorua-Taupo area have been in recent years providing an ever-increasing quantity of timber products. The huge plant constructed for the Tasman Pulp and Paper Company at Kawerau, near Te Toko, in the Bay of Plenty; the similar large enterprise of New Zealand Forest Products Ltd. centred on Kinleith; the construction of a deep-water port at Tauranga for the handling of the Rotorua-Taupo forest products; and the building of new towns, roads, and transport services for a pulp, paper, and timber industry on a grand scale are completing the transformation of what were once desolate pumice plains.

Hydro and Geo-thermal Electricity

A chain of 10 hydro-electric generating stations is planned to use over and over again the power potential of the Waikato River between its outflow from Lake Taupo, through the heart of the pumice country, and down to Karapiro, just above Cambridge. The total planned capacity of the chain of stations is 865,800 k.w. Three stations, Arapuni (157,800 k.w.), Karapiro (90,000 k.w.), and Maraetai (180,000 k.w.), are now generating electricity, and work on Whakamaru (100,000 k.w.) is well advanced (see cover of this issue).

Extensive geological surveys and test borings have been made in the thermal area of the Wairakei Valley, and a mass of scientific data has been accumulated in an attempt to assess the potentialities of the area for the production of geo-thermal power. Considerable power is generated by the harnessing of geo-thermal steam in Italy, and use of similar power in the thermal areas of the Central Plateau would be of great value in the rapid development of the area that is inevitable.

Sportsmen's Playground

Extensive land development and the disappearance of large areas of tussock and scrub from the plains and heavy patches of manuka from the banks of the Waikato River have effected a change in the game population. The wild pigs and wild horses that previously overran much of the area have decreased in numbers, though good pig and deer shooting is still to be had where these animals have been driven back into more rugged, unfarmed areas.

With the grassing of thousands of acres the quail population has increased and pheasants have recently been released in the area by the Department of Internal Affairs.

Duck shooting has always been good on the Waikato River and is improving since Mangakino dam was formed, as the new lake is proving an excellent breeding ground.

Trout fishing in the Waikato River, with both the bait-caster and the fly, has always been popular, and the lakes being formed as the hydro-electric dams are completed will provide even better opportunities for anglers and supplement the world-famous waters of the lakes and rivers of the Rotorua-Taupo district.

The rowing events of the British Empire Games of 1950 were contested on Karapiro Lake, with the grassed slopes surrounding the lake providing an unsurpassed natural amphitheatre for spectators.

The chain of man-made lakes that will be formed with the completion of the hydro-electric programme will provide a concentration of facilities for all forms of aquatic sports that will constitute a remarkable recreation area and tourist attraction.

Vision of the Future

The possibilities that lie ahead of the pumice lands cannot be more than hinted at in this brief survey of the transformation that has been and is still being brought about in an area that 30 years ago was still largely wasteland and was regarded as the worst of problem country. It is doubtful if those few early advocates of pumice land development even in their wildest dreams saw a "vision of the world and all the wonder that would be" that was comparable even with the present state of the area.

The discovery of cobalt as a cure for bush sickness removed the major bar to the plateau's agricultural development and an ever-increasing livestock production seems assured. The influence of large-scale occupation of the plateau by grazing animals and man with ever-expanding agricultural, industrial, and recreational activities can only be surmised. But it seems certain that those who today are amazed at seeing the pumice lands well started on the road to a new future would be equally surprised if they could revisit the area another 30 years hence.

Winter Show Dates

THE following are the dates and venues of winter shows:—

*1, 2, 3, 4, 5, 7, and 8 June—Waikato Winter Show Association at Hamilton.

*4, 5, 7, 8, 9 June—Otago A. and P. at Dunedin.

*15, 16, 17, 18, and 19 June—Taranaki Metropolitan A. and P. at New Plymouth.

17, 18, and 19 June—Te Kuiti and District at Te Kuiti.

29, and 30 June; 1, 2, and 3 July—Whangarei A. and P. Winter Exhibition at Whangarei.

* The Department of Agriculture exhibit will be staged at this show.

Fifth Laying Trial of Prospective Poultry Breeding Stock

IN the fifth breeders' laying trial held at the Department of Agriculture's Poultry Demonstration Plant, Upper Hutt, there were 26 pens or 520 pullets; a reduction of five pens as compared with the previous trial. The 1953-54 trial started on 23 February 1953 and ended 48 weeks later on 24 January 1954. In this article, F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, reviews the results.

AS in previous years each pen was made up of 20 pullets. Of the 26 pens entered for the trial there were 9 pens of Australorps, 1 pen of Black Orpingtons, 2 pens of Rhode Island Reds, and 14 pens of White Leghorns. As the trial is run primarily to give poultry breeders an opportunity for testing pullets as prospective breeding hens—perhaps a new blood line or imported stock—those entering birds are given an option of having their names published in reports or withheld. In the 1953-54 trial two breeders elected to have their names withheld. Consequently in the main production table on page 425 pen numbers only are given in two instances.

No transport difficulties were experienced for this trial, birds arriving to time and in good condition. Reports received since the end of the trial indicate that all pens travelled home satisfactorily and without undue delays.

[*Niederer*

Excellent type of White Leghorn laying pullet. The White Leghorn was the most popular breed at the trial.

Quality of Birds

The quality of the pullets on arrival at the start of the trial varied considerably, and the results given by some pens confirm the doubts felt at the start about the desirability of forwarding such birds to the trial. At the outset some birds appeared to have little or no chance of qualifying as future breeders. It is a waste of money to send such birds to a breeders' laying trial.

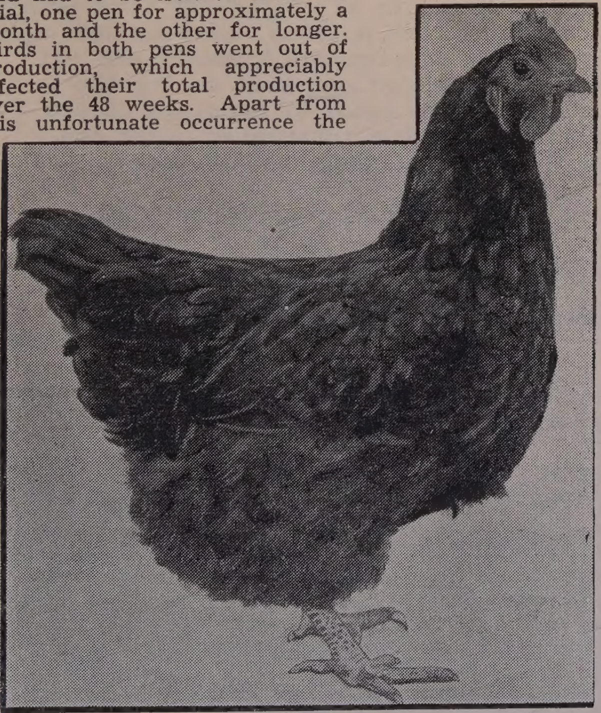
For the first time in 5 years two pens suffered from a form of coryza and had to be isolated from the trial, one pen for approximately a month and the other for longer. Birds in both pens went out of production, which appreciably affected their total production over the 48 weeks. Apart from this unfortunate occurrence the general health of birds was satisfactory throughout the trial.

Management

Management for the fifth trial was similar to that in previous years, the birds receiving wet mash and grain for 6 days of the week and on Sundays an increased grain feed only. Greenfeed was fed daily. The grain mixture fed consisted of wheat, barley, oats, and kibbled maize in approximately the following proportions:—

	lb.
Wheat ..	1,000
Barley ..	150
Oats ..	160
Maize ..	200
	1,510

In previous years the quantity of maize has been varied according to average condition of the birds and the rate of production. In particular it has been considered desirable to increase the maize during the last 2 to 3 months, when the White Leghorns were in heavy production. It was found unnecessary to do this for the birds in the 1953-54 trial. It is reasonable to think that a general improvement in the quality of the ingredients in the mash resulted in the birds maintaining a satisfactory body condition, even during periods of high production.



[*R. W. Orr*

An Australorp of good type. The Australorp was the most popular heavy breed at the trial.

The formula for the mash was:—

	lb.
Bran	22
Pollard	20
Wheat meal	24
Ground oats	7
Maize meal	10
Meat meal (58-60 per cent. protein)	15
Common salt	1
Oyster shell dust (or equivalent lime ingredient) ..	1
	100

To each 100lb. of the mash was added ¾ pint of an oil containing 2000 international units of vitamin A and 200 units of vitamin D per gramme of oil. The cost of feeding referred to later is based on the grain and mash formulae given.

Birds Accredited for Breeding

As the primary purpose of the trial is to find birds which measure up to certain standards for future breeding, it is important first to record pens which gave the greatest number of accredited birds. These are shown in the main production table to the left of the vertical lines. Generally the results obtained in this trial were not as good as in previous years.

A number of birds did not reach the required standard, though they had a production total of 180 eggs or more, because their body-weight and egg size were below the minimums. Body-weight is a controversial subject with a number of breeders, but it is reasonable for the Department to require body-weights closely associated with the minimum weights laid down in the New Zealand Utility Poultry Standards of Perfection 1953 and in line with those required for birds accredited under the New Zealand Poultry Flock Improvement Plan. The standard set for each breed is ¼lb. below the minimum fixed for a hen in the Utility Poultry Standards. The birds at the end of the trial are close to becoming hens, but have not

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passed through their first annual moult; hence the tolerance of ¼lb. It is appreciated fully that some of the birds which fail to meet this standard may, after a full moult, reach the minimum weight set down for hens in the Utility Poultry Standards. Such birds would then be satisfactory as breeding birds. The question of underweight eggs, which follows a different pattern, will be discussed later.

Among the Australorp pens Pen 1 (owner's name withheld) ended the trial with 10 accredited birds, the Poultry Demonstration Plant (Department of Agriculture) with eight, and Greendale Poultry Farm, J. R. Phare, and A. J. Smith with seven each. In the White Leghorn section the pen owned by N. Pak Lim gave seven accredited breeders and the pens of G. W. Wade and C. Walker and Sons Ltd. six each. The figures for accredited birds are lower than those for the 1952-53 trial and the Department would welcome an improvement in this position in future trials.

Egg Production

Egg production for the heavy breed pullets shows an improvement over the 1952-53 trial and is the second highest secured since the trials started. On the other hand production among the White Leghorns fell appreciably and is the lowest yet recorded. It is pleasing that as in 1952-53 two pens of Australorps gave a flock-housed average of over 200 eggs per pullet.

Breeder and pen number	WEIGHT (in pounds) OF EACH BIRD AT END OF TRIAL AND 48 WEEKS' PRODUCTION OF EACH BIRD																				Total for pen (including floor eggs)	Flock-housed average per pen
	Australorps (minimum weight, 6.2lb.)																					
Pen 1	6.2	8.0	6.6	7.5	8.2	6.8	7.2	6.8	7.0	6.7 ‖	6.4	6.0	7.0	6.6	8.2	5.9	6.8	7.5	7.9			
	194	**256**	**219**	**204**	**211**	**183**	**222**	**246**	**211**	**246** ‖	146	221	175	221*	95*	183*	160	145	137		3,857	192.8
Department of Agriculture	7.7	7.0	6.2	7.6	6.5	6.3	7.7	7.8 ‖	6.1	8.4	5.7	6.5	5.7	6.9	6.8	7.0	7.0					
(10)	**210**	**196**	**185**	**184**	**222**	**231**	**195**	**201** ‖	124	171	167	141	109*	153	173	109	173				3,337	166.8
Greendale Poultry Farm	7.8	6.6	6.4	7.5	6.7	7.0	6.4 ‖	7.0	5.6	4.9	6.2	6.0	7.0	6.2	6.5	6.4	6.2	6.3				
(6)	**183**	**223**	**248**	**193**	**250**	**210**	**233** ‖	7	238*	149*	221*	212*	245	225	173*	173	163*	268			4,018	200.9
Phare, J. R. ..	6.3	6.4	6.7	7.6	7.2	6.9	6.7 ‖	5.8	7.9	6.1	7.0	6.7	7.8	7.2	5.1							
(8)	**237**	**234**	**232**	**202**	**180**	**221**	**190** ‖	50	220	158	213	166	158	163	136						3,140	157.0
Smith, A. J. ..	7.2	8.1	6.7	6.8	8.0	6.2	6.8 ‖	6.9	5.8	7.3	7.4	7.2	5.4	7.6	6.7	8.8	4.5	10.4				
(3)	**254**	**194**	**214**	**231**	**204**	**186**	**208** ‖	242*	235	154	212*	132	145	159	193*	165	192*	144			3,745	187.2
Smith, G. L. A. ..	7.4	7.2	6.3	6.5	6.6 ‖	5.2	6.0	5.8	7.2	5.8	6.6	7.2	3.9	8.3	7.0	7.0	6.3					
(9)	**212**	**233**	**215**	**218**	**243** ‖	152*	243	191*	214*	193	184*	118.	161*	109	173	200	168				3,491	174.5
C. Walker and Sons Ltd.	6.4	7.2	6.6	8.5 ‖	5.8	5.2	6.1	6.6	7.8	5.5	7.0	6.6	7.8	5.4	5.2							
(2)	**227**	**193**	**241**	**217** ‖	210	185	283*	235*	217	225*	170	169	162	214	227						3,840	192.0
Willers, R. ..	7.3	7.3 ‖	6.5	6.4	5.8	6.8	6.8	5.8	5.7	6.4	5.8	8.0	5.5	5.9	6.1	5.7	5.8	6.4	8.0	6.8		
(7)	**241**	**203** ‖	235*	205*	192	187*	162	251*	194	176	213*	223*	220	212	219	252	201*	173*	160	142	4,146	207.3
Pen 5	6.5 ‖	6.1	6.8	6.1	6.6	7.0	5.3	7.3	5.8	7.5	7.3	4.5	7.3	5.2	8.2	5.9	7.0					
	196 ‖	182	156	141	192*	162	180	178	152	153	123	143*	161*	139	167	178	132				3,043	152.1
	[Flock-housed average for breed: 181.2 eggs]																					
	Black Orpington (minimum weight, 6.7lb.)																					
Dudding, E. C ..	6.7 ‖	6.4	6.4	5.8	7.7	6.0	8.1	6.2	6.1	5.6	5.5	6.5	6.5	5.1	6.4	6.2	7.1	4.6				
(4)	**256** ‖	201*	182*	186	178	149	174	212	182	130	149*	251	203	232	177	178	124	116			3,600	180.0
	Rhode Island Reds (minimum weight, 6.2lb.)																					
Greendale Poultry Farm	6.5	6.2 ‖	5.4	5.1	4.6	6.0	6.8	5.7	6.0	4.0												
(11)	**204**	**254** ‖	226	123*	59*	163	245	165	224	125*											2,617	130.8
Batkin, L. ..	6.7	5.9	6.1	5.1	5.8	7.0	4.9	5.3	6.0	5.7	5.2	5.1	5.3	6.3	6.0	6.0	6.8	5.4	6.0			
(12)	154	224	181*	219*	144	142	224	164	227*	226	250	177*	180	140*	240	121	160	183*	180		3,658	182.6
	[Flock-housed average for breed: 156.7 eggs]																					
	White Leghorns (minimum weight, 4.7lb.)																					
Pak Lim, N. ..	5.0	5.7	5.3	5.6	5.7	5.2	4.9 ‖	4.4	4.9	4.6	4.7	4.8	5.9	4.9	4.2	5.4	4.4	4.5	4.7			
(21)	**180**	**221**	**213**	**203**	**203**	**215**	**197** ‖	183	192	205*	223*	172	177	179*	191	169	205*	183	171		3,822	191.1
Wade, G. W. ..	5.6	4.7	4.8	5.2	5.2	5.0 ‖	5.6	5.0	4.6	4.5	6.0	4.6	4.7	4.8	4.3	5.4	5.4	5.4	5.4	5.2		
(15)	**199**	**206**	**217**	**190**	**191**	**181** ‖	165	157	190	158	162	187*	225*	167	237	142	161	167	161	155	3,744	187.2
C. Walker and Sons Ltd.	5.0	5.4	5.0	5.2	5.2	6.1 ‖	5.0	5.7	6.8	6.1	4.4	5.8	5.4	5.0	5.3	5.3	5.6	4.7	5.4	5.4		
(23)	**211**	**206**	**192**	**202**	**204**	**186** ‖	138	161	157	168	194	177	167	164	167	148	176	147	159	161	3,584	176.7
Aldworth, A. ..	5.3	5.0	4.7	5.2	5.0 ‖	5.4	5.1	4.8	6.0	6.0	4.4	4.2	5.5	5.7	5.5	6.0	5.0	5.0				
(24)	**221**	**180**	**206**	**182**	**199** ‖	169	133	179	198	163	218*	144	146	168	135	209	210*	140			3,409	174.9
Clark, R. J. ..	5.5	5.7	6.3	4.7	5.1 ‖	6.4	5.3	4.6	5.1	4.8	3.7	5.2	5.1	5.0	6.0	4.4	4.8					
(22)	**188**	**232**	**204**	**224**	**208** ‖	145	158	204	174	92	193*	141	93	150	76	180	168				3,106	155.3
Hepburn, A. W. ..	6.3	5.2	4.7	4.8	5.3 ‖	5.7	4.0	4.9	5.5	6.2	5.3	4.3	5.0	5.3	4.8	4.8	4.5					
(19)	**226**	**193**	**200**	**198**	**240** ‖	23	101*	128	176	162	159	256*	226*	174	195*	199*	176				3,194	159.7
Scott, S. T. ..	4.9	5.4	4.9	4.7	5.4 ‖	3.7	5.1	4.9	5.6	4.5	4.0	3.6	3.8	4.9	5.8	4.2						
(26)	**180**	**190**	**231**	**221**	**192** ‖	139*	158	134	140	216	170*	154	86	157	115	178					2,944	147.2
Crosby, T. B. ..	5.0	5.5	5.0	6.0 ‖	4.3	5.2	4.4	4.5	4.6	4.5	4.6	5.4										
(25)	**247**	**220**	**218**	**184** ‖	119	21	90	198*	120	213	189	175									2,352	117.6
Downey, T. ..	4.9	4.8	5.1 ‖	5.6	4.4	5.2	4.7	4.6	3.6	4.2	4.2	6.4	4.8	4.1	4.9							
(16)	**207**	**187**	**191** ‖	169	196	163	123	169	101	196*	164	153	112	61	172						2.397	119.8
Hetherington, R. W.	5.5	5.3 ‖	5.2	5.6	5.0	5.9	5.0	5.9	4.7	5.8	6.2	5.7	5.8	6.4	5.7	6.1	5.5					
(18)	**220**	**232** ‖	172	179	161	136	167	162	168	149	131	147	53	166	163	158	214*				3,322	166.1
Brown, E. ..	5.4 ‖	5.1	4.7	6.0	5.4	6.2	4.2	5.6	5.6	5.0												
(13)	**199** ‖	28	57*	138	148	107	183	156	115*	158											2,372	118.6
Hibburt, A. M. ..	4.7 ‖	4.5	4.4	4.1	5.0	3.4	4.0	4.2	4.3	4.6	4.3	4.0	4.0									
(20)	**205** ‖	99	150	198	166	163	172	206	147*	129	121	194*	180								3,089	154.4
Roderick, Mrs. G. E.	4.7 ‖	4.2	5.7	4.5	5.5	4.4	4.3	3.6	3.8	5.4	5.3	6.8	5.0	4.7	4.4	5.7						
(17)	**201** ‖	206	172	162	175	115	76	25	105	140	176	95	126	121	197	73					2,361	118.0
Phare, J. R. ..	5.0	6.3	4.3	3.6	2.9	4.5																
(14)	72	128*	85	93	18	103															1,072	53.6
	[Flock-housed average for breed: 145.7 eggs]																					

Only birds alive at the end of the trial are recorded. Birds which were accredited for breeding are shown to the left of the vertical lines and have their figures for egg production in heavy type. Such birds were required to attain the following standards: (a) Laid 180 eggs in 48 weeks. (b) Weigh not less than the minimum weight for the breed. (c) Laid a preponderance of 2oz. or heavier eggs during the periods when eggs were weighed. Pullets which laid a preponderance of underweight eggs (less than 2oz.) have an asterisk against the total of eggs. (d) Be free of any serious body deformity or major breed fault. Where the number of eggs is greater than 180 and egg size and body-weight are satisfactory but the bird is not accredited it may be assumed that the bird has some major fault which made it unfit for breeding.

Pen 7, owned by R. Willers, averaged 207.3 eggs, the highest flock-housed average recorded since the trial began 5 years ago, and Pen 6, from Greendale Poultry Farm, averaged 200.9 eggs.

Pen 21, White Leghorns owned by N. Pak Lim, gained a flock-housed average of 191.1 eggs, approximately 2 eggs fewer than the highest average for White Leghorns in 1952-53. Pen 15, owned by G. W. Wade, gave the next best average with 187.2 eggs. This pen suffered considerably from cannibilism at the beginning of the trial and egg production was adversely affected. This vice started among the pen during its long journey from Whangarei and the trouble was difficult to arrest.

The flock-housed average over all heavy breed pens was 177.0 eggs per bird and for Australorps alone 181.2 eggs. The corresponding figure for light breeds was 145.7 eggs. This is a serious drop compared with previous years. However, the flock-housed average (total eggs laid divided by the original number of birds housed) can be seriously affected by heavy mortality and low production in a few pens. Mortality among the White Leghorns was a major factor in lowering the average for this trial.

The flock-housed average figures for the five trials to date are:—

	1949-50	1950-51	1951-52	1952-53	1953-54
Heavy breeds	149.6	175.0	178.2	174.2	177.0
Light breeds	152.6	151.3	167.7	158.2	145.7

The figures for heavy breeds have been consistent over the years after the first trial.

Egg Size

The main production table (page 425) shows that an appreciable number of pullets laid a preponderance of underweight or small eggs (less than 2oz.) during the periods when all eggs were weighed. This applied particularly to the Australorps, a fact about which concern is felt.

Some of these birds may as hens lay 2oz. eggs, but if any of these are hatched the pullet chicks will very likely inherit the tendency to produce small eggs. Male birds from dams which produce small eggs are liable to perpetuate this undesirable feature in the pullets they sire.

It is easier to lose satisfactory egg size in a flock than to establish good egg size. There is always a temptation to breed from the bird with high egg production and to ignore that such a bird may also have produced underweight eggs. The wise poultry breeder resists this temptation when selecting a bird or at least takes unsatisfactory egg size carefully into account.

Eighteen per cent. of the Australorps alive at the end of the trial laid undersized eggs; the figure for the White Leghorns was 8 per cent. This result is not necessarily characteristic of Australorps as a breed, but results from breeding policy. Some pens produced no undersized eggs.

Food Consumption

As in previous years food consumption in grain and mash was recorded for all birds in the trial. The average per bird for the present trial, together with comparable figures for previous trials, was:—

	1949-50	1950-51	1951-52	1952-53	1953-54
	lb.	lb.	lb.	lb.	lb.
Mash	41.5	45.6	47.9	42.4	44.1
Grain	47.5	47.1	46.2	46.7	44.9
	89.0	92.7	94.1	89.1	89.0

There is little variation in food consumption from year to year. The average cost of food per bird (cost of mash and grain delivered to the Poultry Demonstration Plant, including the cost of the oil incorporated in the mash) for 48 weeks during the past 5 years was as follows:—

1949-50		1950-51		1951-52		1952-53		1953-54	
s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
15	8	18	2	23	2	23	10	24	2

For the benefit of those who may wish to make comparisons of costs with food prices in other districts, the prices of mash and grain fed at the 1953-54 trial were:—

		Per ton (2000lb.)		
	d.	£	s.	d.
Mash (including feeding oil)	3.34	27	16	8
Grain	3.19	26	11	8

Mortality

There was an increase in mortality in this trial compared with the last trial with both heavy and light breeds. Figures for the past 5 years are:—

MORTALITY PERCENTAGES

	1949-50	1950-51	1951-52	1952-53	1953-54
Heavy breeds	12.5	10.8	19.4	12.9	15.4
Light breeds	18.1	16.2	14.4	17.1	22.8

All birds which died or had to be killed were sent to the Department of Agriculture's Wallaceville Animal Research Station for post-mortem examination. A summary of the findings is as follows:—

Cause of death	No. of birds Heavy breeds	 Light breeds
Avian leucosis	14	23
Coccidiosis (intestinal) ..	4	8
Roundworms	—	4
Egg peritonitis	2	8
Impaction of crop or gizzard	5	1
Tumours	1	—
Vent picked	2	7
Cystic oviduct	1	—
Sour crop	—	1
Abscess on lung	—	1
Vent gleet	1	1
Internal hemorrhage ..	1	1
Visceral gout	1	1
Ruptured spleen	1	—
Localised pasteurella ..	—	1
Blocked larynx	—	1
Infectious coryza	1	—
Miscellaneous	3	6
	37	64

The most significant figures are those for avian leucosis. During the 5 years of the trials avian leucosis has caused over 32 per cent. of the losses each year. In the 1951-52 trial the figure reached 41.5 per cent.

In the 1953-54 trial 3 pens ended the trial with a full complement (20 pullets). On the other hand heavy losses were sustained by some pens.

Ruakura Farmers' Conference Week

THE programme planned for the Sixth Annual Farmers' Conference Week of the Department of Agriculture's Animal Research Station, Ruakura, comprises papers from leading New Zealand agriculturists and scientists. The Conference will open at Ruakura on Tuesday 15 June and will continue until Friday 18 June.

As in other years a feature of the week will be the field day on Wednesday. Farmers will be able to inspect the sheep and dairy sections at Ruakura, the New Zealand Dairy Board's Artificial Breeding Centre, Newstead, and the Ruakura Hill Country Research Station. Buses will circulate continuously on a fixed route (including Newstead), along which a wide variety of demonstrations will be arranged. Visitors will thus be able to see as much or as little of each demonstration as they wish. On the same day sheep farmers may see the Hill Country Station at Whatawhata.

On Wednesday evening at the Ruakura staff centre the Director-General of the New Zealand Department of Agriculture, Mr. E. J. Fawcett, will discuss the future agricultural production requirements of New Zealand.

During the Conference two papers will be given by Dr. C. P. McMeekan, Superintendent of the Station. Among the other speakers will be Dr. M. A. MacDonald, late of Oregon State College, U.S.A., and the Department of Agriculture, Canada; Dr. I. J. Cunningham, Superintendent, Department of Agriculture's Animal Research Station, Wallaceville; Professor W. Riddet, Vice-principal and Dean of Dairying, Massey Agricultural College, Palmerston North, and Director of the Dairy Research Institute, New Zealand Department of Scientific and Industrial Research; and Mr. A. S. Wyllie, pedigree breeder, Te Awamutu.

An outline of the programme is as follows:—

SECTION FOR SHEEP FARMERS
(Tuesday 15 June)

Morning: “Recommended Techniques in Fat Lamb Farming” (C. P. McMeekan); and “Meat Production per Acre” (D. E. Walker). Film, “Grass to Meat”. Afternoon: “North American Practices in Beef Cattle Breding” (M. A. MacDonald); “The Early Weaning of Hill Country Hoggets” (E. A. Clarke); and “Pasture Improvement on the Te Awa Hills” (F. E. T. Suckling). Evening: Symposium on Worms in Sheep (E. A. Clarke, D. B. Filmer, and L. K. Whitten).

SECTION FOR ALL FARMERS
(Wednesday 16 June)

Field day. Evening: “The Future Agricultural Production Requirements of New Zealand” (E. J. Fawcett).

(Thursday 17 June)

Morning: “Molybdenum in Animal Health” (I. J. Cunningham); “The Use and Misuse of Lime on Grassland” (D. F. Waters); and “Current Problems in Weed Control” (F. B. Thompson). Afternoon: “Producing Quality Beef from Dairy Stock” (P. Radford); “Grass Staggers in Beef and Dairy Cows” (J. C. Gerring and R. R. White); and “Milk Producing Value of Summer Feeds” (J. C. Percival). Evening: Symposium, “Maintaining Summer Dairy Production in the Auckland Province” (R. A. Candy, G. Jowsey, and W. Riddet).

SECTION FOR DAIRY FARMERS
(Friday 18 June)

Morning: “What's New on Bloat?” (A. T. Johns); “Rearing of Dairy Stock” (C. P. McMeekan); and “The National Hybrid Pig” (D. M. Smith). Afternoon: “The Pedigree Breeders' Place in the Future of the National Herd” (A. S. Wyllie); “Dairy Farming as a Business” (R. T. du Faur); and “The Ruakura Milking Machine” (D. S. M. Phillips).

The Home Orchard in Winter

By C. E. K. FULLER, Horticultural Instructor, Department of Agriculture, Hamilton

MOST important of winter work in the home orchard is usually pruning, but another important task is the planting of fruit trees. Fruit plants sometimes live and do well even if carelessly planted, but such cases are exceptional and are usually due to favourable seasonal and soil conditions. The only procedure which can be recommended is that of care at every stage of planting.

ONE of the most important problems in the establishment of a home orchard is the choice of varieties. This depends primarily on the preferences of the household, the purpose for which the fruit is to be grown, and the local climatic or soil conditions.

Following are a few general rules for the intending home orchardist in the choice of varieties:—

1. As far as is practicable the planter should follow his personal preferences, choosing the type of fruit which will be most in demand or in which most interest will be taken. These types are the ones with which he will most likely succeed.

2. The purpose for which the fruits are to be grown, whether for dessert, jam, or bottling, should be considered and preference given to the varieties best suited to meet those purposes.

3. A variety may be unsuitable even if it is outstandingly successful in another district. Varieties have distinct adaptations to geographical areas. Kinds and varieties of fruit which are successful in the South Island may be quite unsatisfactory in, say, the Auckland Province, and the converse may be equally true. Lists of fruits recommended for different districts may be found in the Department of Agriculture's Bulletin No. 310, "The Home Orchard".

4. Fruits should be planted to meet the family needs and if possible to give a sustained yield over a long period. In the northern districts of the North Island fresh fruit in one form or another may be available over nearly the whole year.

Buying the Trees

When possible it is best to order trees late in summer or early in autumn while supplies are still plentiful. First-class stock should be bought, emphasis being placed on health and vigour and not merely on shape and appearance of the trees. First-class trees are usually of medium size for their age, vigorous, shapely in body and head, with clean trunks and abundant roots, and free from disease. It is important also that the main limbs should arise from slightly different levels on the trunk, because if all come from one point, the tree is more likely to split when carrying a heavy crop. It is often thought that large size is itself a great merit in trees, but this is not always so. Vigour, cleanliness, stockiness, and firm, hard growth are much more important than large size.

Dwarf and Standard Type Apple Trees

Whether standard or dwarf apple trees should be chosen depends on circumstances. Dwarf apples are interesting and excellent for the home orchardist where a good range of varieties is desired in a small space. They begin bearing at an early age and, because they are small, spraying, pruning, thinning, etc., are easier, a point which often results in the trees receiving better attention.

When to Plant

Root growth tends to be slow in spring on deciduous trees newly transplanted until it is aided by the growth of young shoots. Yet there is some new root growth on trees in warm soil in winter while the leaves are off, and young trees of nearly all species when planted in autumn will make some root growth before the soil becomes too cold. With the advantage of these new roots and the settling of the soil against the old ones trees planted in autumn tend to make stronger early spring growth than trees planted in spring, provided the autumn planted trees are not injured by severe winter conditions.

Planting is to a large extent governed by the time of receiving the trees from the nursery and the condition of soil.

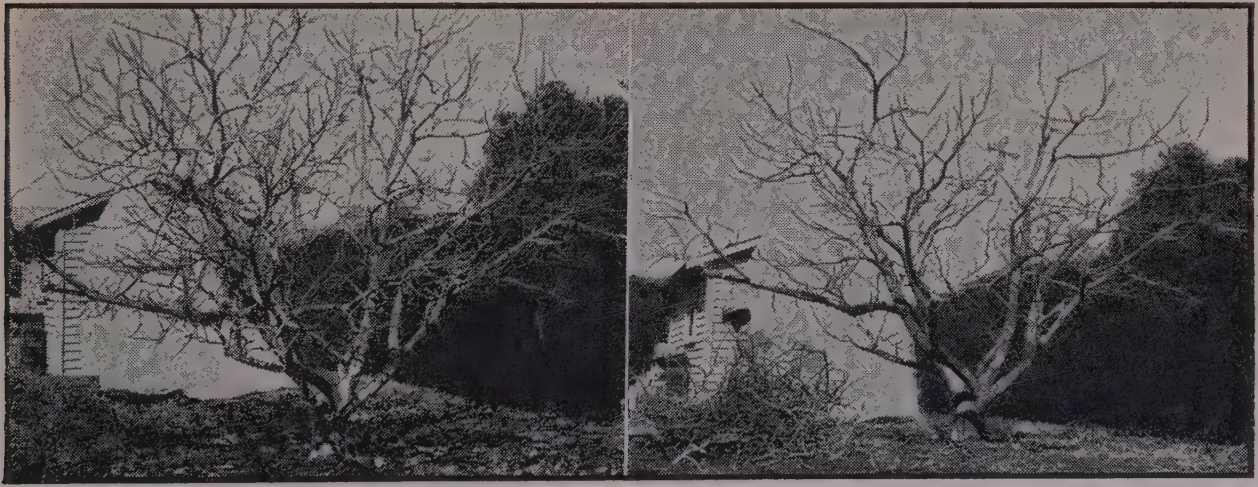
If conditions are unsuitable for planting when the trees are received from the nurseryman, the trees should be heeled in on well-drained land, each tree being placed separately so that the earth will be on all sides of the root.

Citrus and sub-tropical fruit tree planting is best done in early spring, when weather and soil are becoming warmer.

Size of Tree Holes

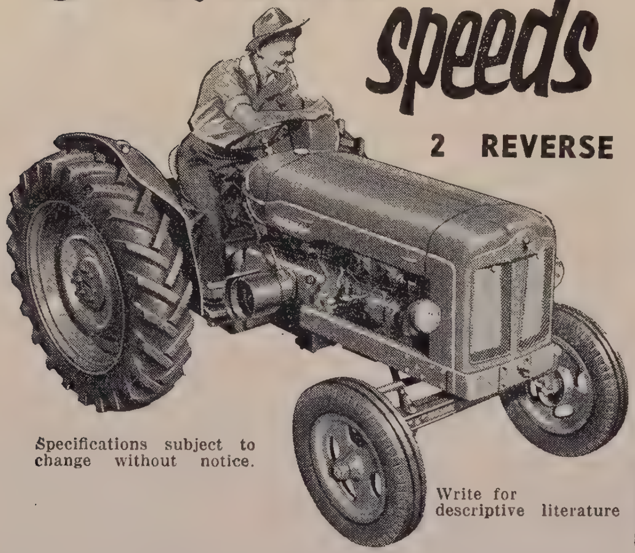
Planting holes in good soil need not be of a greater diameter than is necessary to accommodate conveniently the trimmed roots of the trees. In poorer soils large holes may be dug and filled with better soil. Deep holes in heavy clay should be drained to enable surplus water to escape from the new soil.

A common mistake with domestic growers is to plant too deeply. The depth should be the same as that at which the trees have been growing in the nursery, and this is indicated by the soil marks at the base of each tree. Air circulation in the soil is essential to root growth of plants, and too deep planting may cause excessive losses or setbacks of newly planted trees. On the other hand, very shallow planting should be avoided or roots



[*Sparrow*

Left—A typical home orchard apple tree that had been pruned by the owner. Right—The same tree after being repruned to remove spent fruiting wood and crowded limbs.



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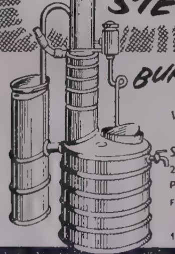

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Planting

When pip and stone fruit trees are being prepared for planting the roots may be cut back fairly severely, but citrus trees, being evergreen, should not have the roots cut back too closely. As a rule the fruit tree roots are not trimmed before leaving the nursery.

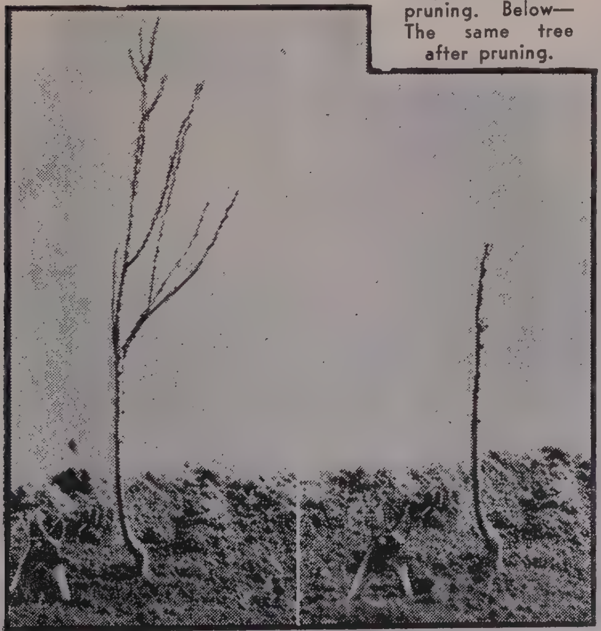
It is advisable to make fresh, clean cuts with a sharp knife or secateurs and to remove all broken roots before planting. The retention of the fine, fibrous roots is no advantage, as these invariably die if the trees have been out of the soil for some time. New rootlets will develop along the full length of the main roots, which will extend from the cut ends.

New root growth will proceed more satisfactorily if there is good contact of the soil with the roots, which is usually attained by pressing down with the foot as the hole is being filled.

The young tree can be helped to a new start by the sprinkling on of a double handful of manure such as blood and bone when the hole is about half filled. The fertiliser should not be placed in direct contact with the roots. The final layer of soil should be placed loosely around the tree, with the level slightly above the usual soil level to allow for settling. If conditions are dry, the trees should be watered in.

Pruning Back the Tops

After deciduous trees have been planted the tops should be pruned to two or three sturdy leaders, which should be shortened to about a third of their length. Failure to do this may result in poor establishment and weak growth for the first year. Citrus trees will not require much heading back of the main shoots, but the leaders should be defined by cutting out all but two or three strong shoots.



Left—A badly shaped tree before pruning. Below—The same tree after pruning.

Planting Distances

The larger trees such as apples, pears, peaches, plums apricots, and cherries should be spaced 12 to 18ft. apart according to soil and growth conditions. Wider spaces are needed if trees are in blocks of several rows.

Chinese gooseberries are vigorous plants and need plenty of room to extend; they should be planted from 15 to 20ft. apart. Passion fruit may be planted 12 to 14ft. apart.

Both passion fruit and Chinese gooseberries need support and should be grown along or over a trellis or fence.

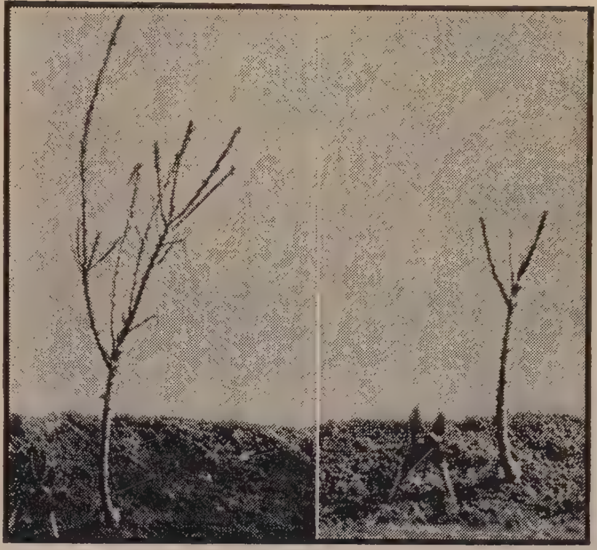
If at all exposed to wind, tree tomatoes should be provided with firm support such as a sturdy stake, as they are shallow rooting and easily blown over. They may be as close as 8ft. in the row. They should be planted in sheltered, warm positions, but will not thrive if the soil is too dry.

Because they are evergreens, grapefruit, oranges, mandarins, and lemons—especially the Meyer lemon—make excellent shrubs for the front lawn, and more use could be made of these trees for this purpose.

When grown as a continuous fence raspberry plants should be set 18in. apart and when grown as bushes they should be set 4ft. apart; gooseberries should be spaced at least 4ft. apart and currants 4ft. to 6ft. If more than one row is required, 5ft. should be allowed between rows. From half a dozen to a dozen bushes are usually sufficient for the average home orchard.

Loganberries should be grown along a fence or trellis, and plants should be 8ft. to 10ft. apart.

Strawberry plants should be set at the depth shown in the diagram on the right and about 9in. to 15in. apart with 2ft. between rows. It is an advantage to plant strawberries in raised beds to secure the benefits of good drainage and a free root run.



Left—A well-balanced tree before pruning. Right—The same tree after pruning.

Pruning

As soon as the leaves of deciduous fruit trees have fallen pruning may be started.

Pip Fruits

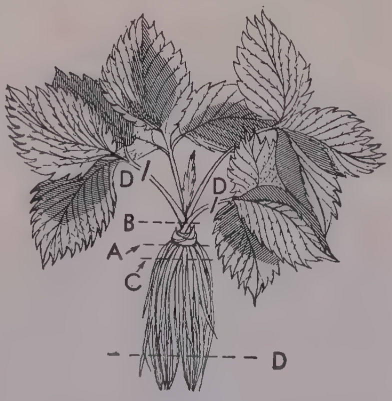
Apple and pear trees fruit on laterals and spurs 2 years old and older. Laterals are preferable to spurs, being better conductors of plant food and are more easily removed by being cut back when they have become aged and weak.

A bearing tree may be pruned annually by the following treatment of the fruiting parts:—

1. Cutting back the greater part of the old and exhausted laterals and spurs to promote new growth.

2. Shortening where necessary present healthy fruiting wood to prevent overcrowding.

3. Thinning future fruiting wood, consisting of new laterals or spurs, to prevent overcrowding.



A strawberry plant should be planted at the depth A. B is too deep and C is too shallow. Leaves and roots should be trimmed at the points D.

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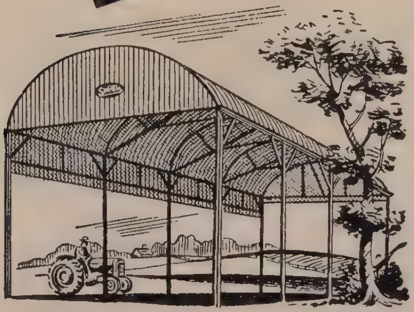

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Stone Fruits

Peach and nectarine fruit only on lateral growth made the previous season, and the correct treatment of bearing trees consists of the removal of the 2-year-old laterals and thinning of the 1-year-old wood sufficiently to prevent overcrowding.

Plum, apricot, and cherry trees fruit mainly on spurs 2 years old and older. Robust fruiting laterals are preferable to spurs, which soon become weakly and carry poor-quality fruit. Between 25 and 30 per cent. of the older spurs and laterals should be cut back.

Small Fruits

Raspberry bushes fruit on canes produced the previous season. All canes which have cropped during the season and any of the new season's canes which are weakly or diseased should be removed at ground level. To make spraying easier and to improve the ripening of the new wood this is best done as soon as the crop has been harvested.

Gooseberry bushes fruit on spurs on 2-year-old and older wood. The bushes should be kept open and old wood should be cut back each winter to promote sufficient new growth each year to replace old spurs as they become weakened. The best fruit is grown on 2- and 3-year-old wood.

Black currant bushes produce the best fruit on the previous season's growth. All branches that have fruited should be pruned out, strong young wood being left for fruit production. To assist in disease control and the proper ripening of the next year's fruiting wood this work may be done soon after the fruit has been harvested.

Red currant bushes fruit in the same manner as gooseberries, and the fruiting laterals and spurs should be renewed every 4 or 5 years, as the spurs on older fruiting wood tend to produce less and smaller fruit. Each bush should be kept sufficiently vigorous to develop at least four or five new vigorous shoots annually.

Detailed information about the pruning of fruit trees can be obtained from Bulletin No. 310.

Routine Work

To control scale insects, woolly aphides, and red mite eggs winter oil should be applied to all deciduous fruit trees and to berry fruits other than strawberries while they are dormant. The strength of the spray should be 1½ pints of oil to 4 gallons of water.

As soon as pruning has been completed the prunings should be picked up and burnt.

It is advisable to dig over the ground round the trees in winter and so bury fallen leaves and rotting fruits. Digging should not be so deep that it will damage tree roots and it is advisable to leave the surface rough to discourage weed seed germination.

Where trees are growing in lawn to the trunk raking up of fallen leaves is advantageous.

Fertilisers containing phosphate and potash may be spread before the digging so that they will be turned well under.

Fertilisers containing nitrogen are best applied about the time of bud movement in spring and should then be hoed in.

Protecting Hay from Damage from the Weather

THE introduction of hay baling has made it more difficult to prevent spoilage of hay through winter rains. Each year thousands of tons are lost, but with a few precautions much of this waste could be prevented. Because of the difficulties experienced in protecting baled hay in a stack in the open field many farmers have erected Dutch barns, and this method is undoubtedly the best. Nevertheless, some farmers have been very successful with various methods to protect baled hay in stacks. Several farmers in the Waikato district have found that provided a stack is well built with a steep pitched roof and covered with raked hay, a wire-netting covering extending to the eaves and held in position by weights is all that is required

NOT only does the wire netting hold the hay in place, but it also has a thatching effect, and this method is just as efficient and more economical than using sacks or tarpaulins.

The wire netting is run over the top of the stack at right angles to its length and extends to below the eaves. Battens are attached to the ends of the netting, and weights are then attached to the battens. This exerts an even pressure along the whole width of the netting. The side wires of the netting are cut at approximately every foot to prevent the bellying effect which often occurs with wire netting.

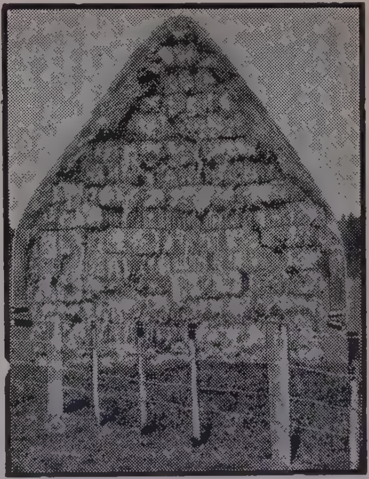
Adjusting Weights

As the stack settles the weights should be adjusted so that they do not rest on the ground and become useless. The final adjustments should be made in March. The wires holding the weights should be attached to the netting at the eaves. On no account should the wires be run over the top of the stack, as then they would cut into the ridge-line, causing hollows and thus letting the rain in.

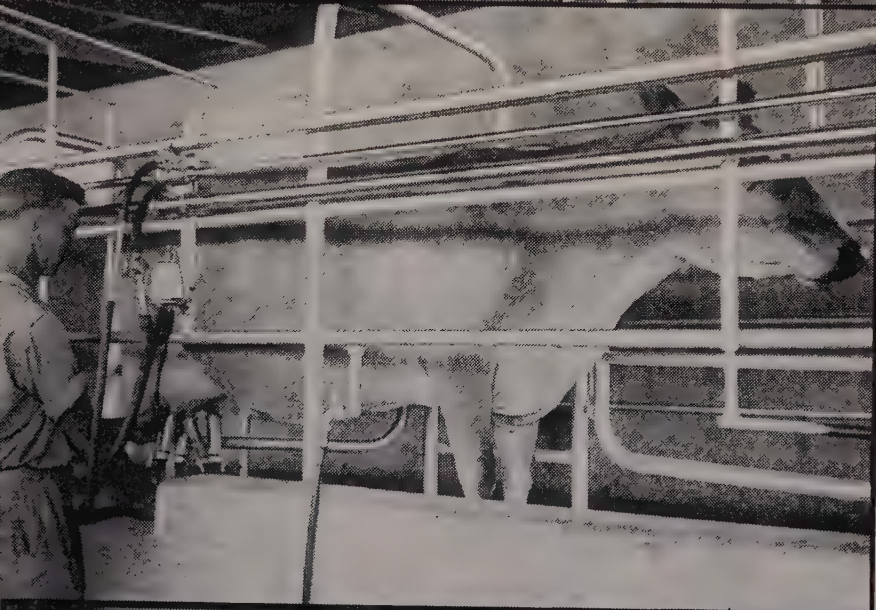
When the netting or weights are being adjusted ladders should always be used and care taken not to tramp on the haystack and form holes, as water will collect in these and cause considerable damage.

—*A. O. WARNER, Instructor in Agriculture,*
Department of Agriculture, Hamilton

Above—Well-covered stacks of baled hay with wire netting holding down covering of loose hay. Below—End view of stack, showing well-pitched head and ends of netting weighted by posts.



LARGE MILKING SHED OPERATED BY TWO PERSONS



Upper left—Cows entering the yards from the central farm race through a short concrete control race. All drainage is taken in one straight fall to the end of the concrete race for disposal. The exit race is shown in the foreground. Above—Cows awaiting their turn on the up-ramp and others returning via the down-ramp after being milked. The udders are washed in the bail. At left—A close view showing how stoopless milking is done and how the standing operator applies the teat-cups. Lower left—An interior view from the ramps showing the raised platform and milkers' alley. The raised platform occupies the space used by the dummies in an orthodox shed. Below—A view from the back of the raised platform showing the tandem bails, tandem race, and entrance.

Elevated Bail Sheds for Stoopless Milking

By W. G. BATT, Supervisor of Farm Dairy Instruction, Department of Agriculture, Hamilton

A CONVENIENT elevated bail system of stoopless milking has been incorporated in plans drawn up by the writer and adopted by the Dairy Division of the Department of Agriculture for sheds that can be built at a cost that does not appreciably exceed that of a dummy bail shed. That the plans are practical and the installation of the stoopless system is a good proposition for the dairy farmer are shown in this article with its illustrations of sheds built basically to the final plans and in highly successful operation for some months.

THE construction of elevated bail milking premises for Mr. C. G. Prevost, of Manurewa, near Auckland, from plans prepared by the writer and incorporating an adaptation of an American type bail to New Zealand conditions was described in the August 1952 issue of the "Journal". Though they were more elaborate in detail than premises required by the average farmer, these premises enabled a study of stoopless milking in a practical form suitable to New Zealand conditions.

Old Type Sheds Unsuitable

Previous attempts to provide for stoopless milking in New Zealand have had only limited success, and usually the obsolete race type of shed has been used. Though such buildings can be used to incorporate raised bails at a lower cost, they do not provide facilities for good milking technique, are inconvenient to operate, and make difficult maintenance of a high standard of hygiene. In fact, the disadvantages of the race shed—out of date for 25 years—are extended in this way.

Factors Involved in Designing

Planning and construction of premises for stoopless milking must take into consideration speed of milking and convenience of the operators, sanitation and the maintenance of hygiene, and, more particularly, correct milking technique.

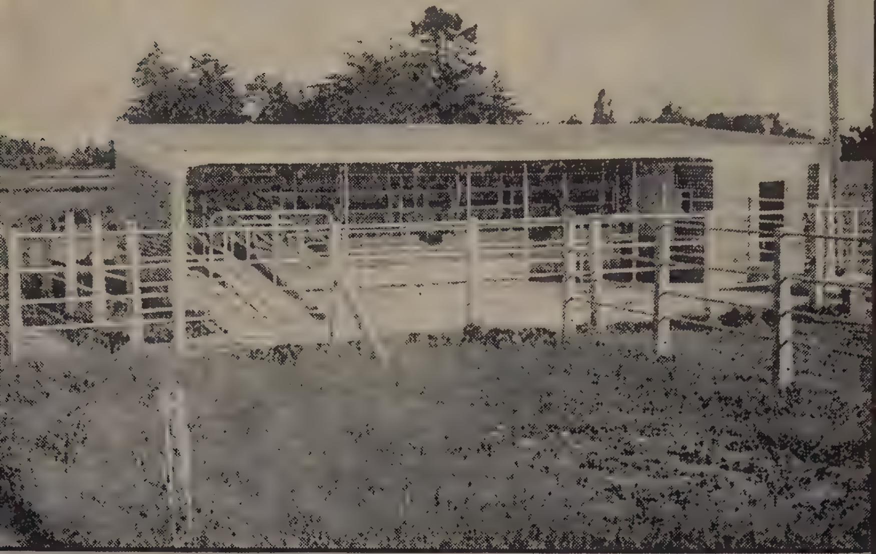
Proper Milking Technique

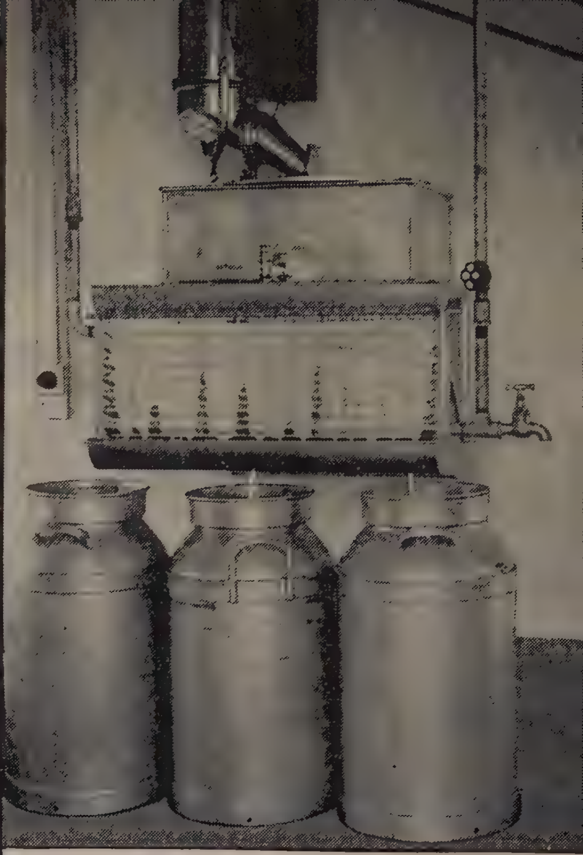
A good milking technique involves a stimulating washing procedure which not only removes dirt from the teats and udder but also provides enough stimulation to give a good let-down; use of a strip-cup into which a squirt of milk is taken from each teat as a check on the possibility of mastitis; and application of the teat cups immediately after the washing and squirt-taking procedure is complete. Where machine stripping is practised it should be begun as soon as the milk flow rate begins to slow down, and the cups should be removed when the flow falls below ½lb. per minute.

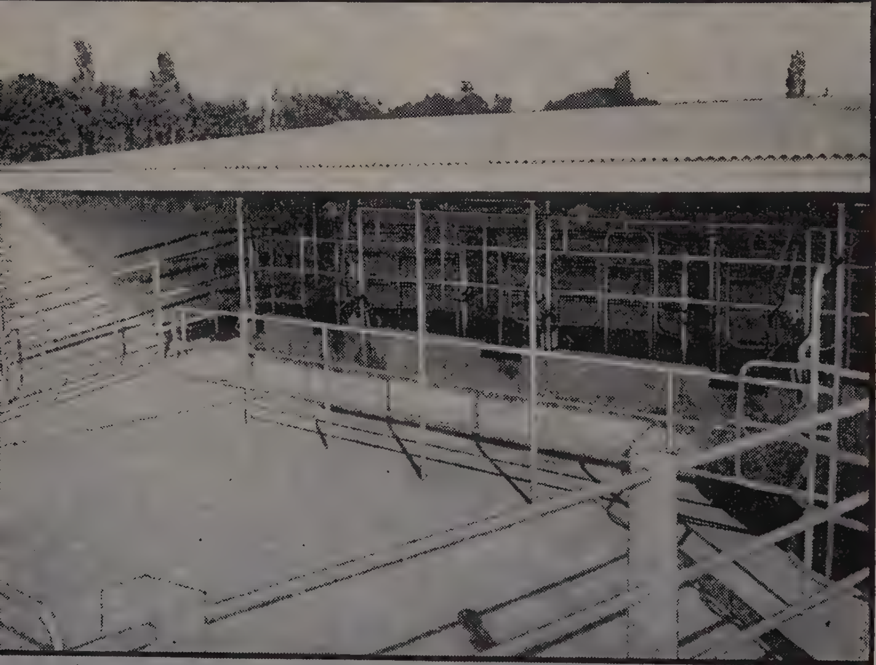
HEADING PHOTOGRAPH: The premises of Mr. L. O'Sullivan, Matamata, Waikato, which with six tandem bails and two operators handles 120 cows.

Part of Mr. O'Sullivan's fine dairying land at Matamata.

SMALL MILKING SHED OPERATED BY ONE PERSON







Upper left—Mr. G. L. Stewart's premises at Orari, South Canterbury, which with three tandems and one operator handles 40 cows. Above—A portion of the releaser room, showing the use of a small vat to regulate the flow and to control the volume of milk over the cooler. At left—A view of the shed's interior showing the raised platform, ramps, and yard. Lower left—Cows entering the yard from the central farm race and concrete control race. Control of the stock traffic keeps the immediate surroundings sanitary. Below—A view of the shed showing a cow entering the tandem bails by the up-ramp and other cows returning by the down-ramp after being milked.

Photographs by Bremford Studios

A planning which ignores these fundamentals provides unsatisfactory milking and there is generally a fall in production. Clearly the designing of an efficient shed involves consideration of the points described.

For these reasons the use of the old type race bail and race type of shed wherein the operators work between two rows of cows, on raised platforms or otherwise, is most unsuitable, and the milking of cows in batches of equal numbers is a more unsatisfactory development. The double race bail and double race type of shed do not provide for good milking methods or technique in either orthodox or stoopless milking.

Any procedure which involves washing a batch of cows before the cups are applied is unsatisfactory. The use of race bails requiring such a procedure may produce very faulty letdown responses when the time between washing and application of the cups is excessive. It is important to realise that the duration of action of the let-down hormone is both brief and variable. If stripping and a second let-down are to be avoided, the cow must be properly stimulated at the start and the cups applied immediately, so that none of the active letdown period is lost.

Modified Planning Introduced

The planning of Mr. Prevost's premises introduced a new principle and was an adaptation of American tandem bails to the orthodox New Zealand open-fronted milking shed. The early successful operation of these premises indicated that a modified and less elaborate construction featuring the same principles would find much favour with practical dairy farmers. Plans were drawn for individuals who decided to construct such premises.

In the autumn of 1953 a number of farmers showed a keen interest in this new departure, the first being Mr. L. O'Sullivan of Taihoa, Matamata, whose enterprise has extended this principle of milking and provided much practical information. He was closely followed by several others throughout the Dominion, and the following farmers have already constructed and are operating sheds erected to this principle and modified planning. Others are being built and a greater number are likely to be started in the coming winter. Some featuring 8 tandem bails are being built.

Farmer	Cows	Tandem bails	Operators
Mr. L. O'Sullivan, Taihoa, Matamata	120	6	2
Mr. S. G. Slater, Greytown	140	6	2
Mr. H. O. Wilson, Otewa, Otorohanga	140	6	2
Mr. C. S. Brewster, Pukekawa, Tuakau	80	4	1
Mr. G. L. Stewart, Orari, South Canterbury	40	3	1

The same principle is maintained in both plans, but the washing bail featured in the larger sheds has been dispensed with where one person handles the herd. In the smaller shed washing is done in the milking bails and entry of cows to the tandem race is controlled by a gate at the head of the up-ramp and operated by a rod extending in front of the bails.

All Sheds Very Successful

All these sheds have now had several months' use and have been highly successful. They have provided satisfaction to their owners and a high standard of hygiene has been promoted and maintained. The cows have reacted to the ramps, races, and bails with no more trouble than in dummy bails. The bailing of cows through the up-ramp and race, thought by some critics to be a probable disadvantage, has not been a problem. In fact, most cows wait their turn on the ramp and require no driving or bailing.

Plans of Milking Sheds

THE plans that have now been drawn up for 2-men and 1-man sheds incorporating stoopless milking as described in this article have been adopted by the Dairy Division as its official plans. They are meant to be used in conjunction with the standard plan of the Dairy Division for external- and internal-race types of milking sheds, to which they can be adapted. Farmers requiring copies of any of the plans should apply to their local Farm Dairy Instructor.

Main Advantages

The principal advantages of this method of milking and this form of construction are as follows:—

Cows are more contented and the majority show no sign of nervousness even in the presence of anything unusual. This is in contrast to dummy bails and is perhaps due to the animals being able to see the shed operations. Better milking is therefore likely.

In raised tandem bails cows are milked much faster than in the average single-unit dummy bails. Each shed erected to date has averaged 10 or more cows per set of cups per hour, even in the early months.

The labour of milking is much reduced. In the larger sheds two operators, and in the smaller sheds one operator, will milk more cows in similar time with much less effort and with greater attention to detail. Because all stooping and squatting is eliminated, most of the work and drudgery of milking are removed.

Because the cows largely bail themselves and no breeching chains or leg ropes are required, milking is faster and also more hygienic. The savings made in elimination of these preliminaries provide more time for closer attention to milking technique and to more effective udder washing, and for checking of mastitis and other essential details.

The simple construction makes possible a high standard of sanitation. Because cows are more contented and are not nervous, soiling of bails is very rare.

Costs of construction have been reduced in the modified planning, and now do not appreciably exceed those of a dummy bail shed. The savings in time and labour fully compensate for any additional cost.

The farmers listed have shown commendable initiative and enterprise in extending this method of stoopless milking in a satisfactory, practical form. Though each shed is constructed to the same planning, with variations in layout to suit individual sites, the owners' co-operation has provided much information on the practical value of the principle and has provided the means for determining whether further modifications or improvements could be made. In this way these farmers have provided a service to the farm section of the dairy industry, and dairy farmers who become interested in this new departure now have the practical experience of these men as a guide to their conclusions.

Dairy Division Plans

As a result of experience gained in this practical field, and the observations of milking under average New Zealand conditions, the Dairy Division has prepared for general distribution standard plans setting out the principal details of construction. Such standard planning has taken into consideration all relevant aspects, including the availability of let-down in relation to the application of teat-cups. This enables the teat-cups to be attached immediately the cow reaches the individual bail. Such practice saves valuable time and promotes better milking. To those farmers interested this planning is commended as the most satisfactory means of providing for stoopless milking. It is felt that better milking practice is possible from this method.

The plans are prepared in two parts to meet the requirements of owners of large and small herds. Elevated Bail Plan A is drawn for the large dairies operated by two persons and Plan B is designed for the smaller one-person dairy. The size of shed to meet individual requirements can best be calculated on the basis of 10 cows per bail per hour and the over-all time the farmer is prepared to allow for milking. Thus a farmer with a herd of 80 cows using 4 tandem bails will have an average milking time of 2 hours, and two operators using 6 tandem bails would milk 120 cows in the same time.

The most economical and convenient sizes for average practical purposes will be 4 tandem bails for herds of from 30 to 80 cows where one person does the milking, and 6 tandem bails for herds of 80 to 140 cows handled by two milkers.

Race bails are not satisfactory for good elevated bail milking and the tandem type bail and race combination is favoured. Tandem bails are constructed to a specification available from the Dairy Division and can be made up by constructing firms. Such bails are fabricated from piping and dispatched to the farmer in sections for erection and welding together in the shed. The cost of a tandem bail approximates that of a dummy bail in the same material.

Stoopless milking in premises suitably planned and constructed from a consideration of the fundamentals of good milking is likely to become increasingly popular throughout the Dominion. The planning described here embodies all relevant details and is recommended by the Dairy Division.

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FARM SCHOOLS IN BAY OF PLENTY

By G. J. NEALE, Editor, Department of Agriculture, Wellington

A FARM School organised by the Extension Division of the Department of Agriculture and comprising a panel of speakers on agricultural and farm-home subjects and backed by some of the Department's A. and P. show exhibits moved through the Bay of Plenty district during 3 weeks in March and April (see map). The writer joined the school at Whangamata and left it after its visit to Matakana Island. His impressions of the value of the school and the support it received are thus based on only part of the tour, but as the panel of lecturers and their subjects were basically the same at each centre visited for a 2-day school, comments will be applicable to the complete tour.

FARM schools of many kinds and different scope have been a part of the extension work of the Department for many years. They are generally arranged to cover part or nearly all of the district of an Instructor in Agriculture, who usually has the enthusiastic support of local branches of Federated Farmers, Young Farmers' Clubs, and rural women's organisations. Panels of speakers are not necessarily confined to officers of the Department, the basic consideration being the provision of as complete information as possible on the needs and problems of farmers in the district.

The instructorates of A. V. Allo, Instructor in Agriculture, Tauranga, and S. R. Hewitt, Instructor in Agriculture, Whakatane, which were visited by this school are part of the large area in the middle eastern part of the North Island which was covered by the Kaharoa ash showers and where the occurrence of "bush sickness" discouraged the development of livestock farming for many years in the eastern part of Tauranga County. Mrs. Hugh Stewart, whose husband took up land near Katikati when the settlement was established under the Auckland Waste Lands Act of 1874, wrote in her book "My Simple Life in New Zealand": "We took a walk over wild, uncultivated, undulating land feeling homesick and depressed . . . tea tree covered most of our land, was good for nothing but firewood, and after clearing, burning, ploughing and cropping came up again and again from seed." Great courage was needed to undertake land development without superphosphate, without Certified seeds, and without markets. Bush sickness, the one great hindrance to increased production and land development, was not finally resolved until 1935, when cobalt was discovered as a cure and the way opened for an expansion in livestock farming.

Upward Spiral of Production

The magic of phosphate topdressing, the adoption of cobalt topdressing, and the use of Certified seeds were the three things needed to bring about in the Bay of Plenty an upward spiral of production that had resulted in Tauranga County "probably doing better than most parts of New Zealand", said Mr. P. W. Smallfield, Director of the Extension Division of the Department of Agriculture, in a special illustrated address to the school at Katikati.

"If on my first visit to Katikati in 1920, when I was touring the Bay of Plenty urging farmers to adopt superphosphate topdressing, I had said that it was possible to take virgin scrubland, cultivate it once, sow it in ryegrass and cocksfoot, and get a good permanent pasture, I would have been laughed at. The ryegrasses were false perennials and the white clovers were low-producing strains. Land development in the 1920s was very much in the doldrums. A man undertaking it would not get his money back."

In a series of statistical slides Mr. Smallfield showed how in 30 years in Tauranga County the area in grass had increased 50 per cent., the area in crops had declined 70 per cent., dairy cow numbers had increased by 300 per cent., total cattle by 100 per cent., breeding ewes by 4000 per cent., and total sheep by 1800 per cent. Essentially this had been done by more than doubling the carrying capacity of grassland from 2.2 ewe equivalents in 1922 to 4.9 ewe equivalents in 1952.

Heading photograph and at right opposite—The school's equipment, taken by barge across Tauranga Harbour, comes ashore at Matakana Island.

Mr. P. W. Smallfield: In 1920, a voice crying in the wilderness, "Sow superphosphate." In 1954, "great deal accomplished . . . much remains to be done."

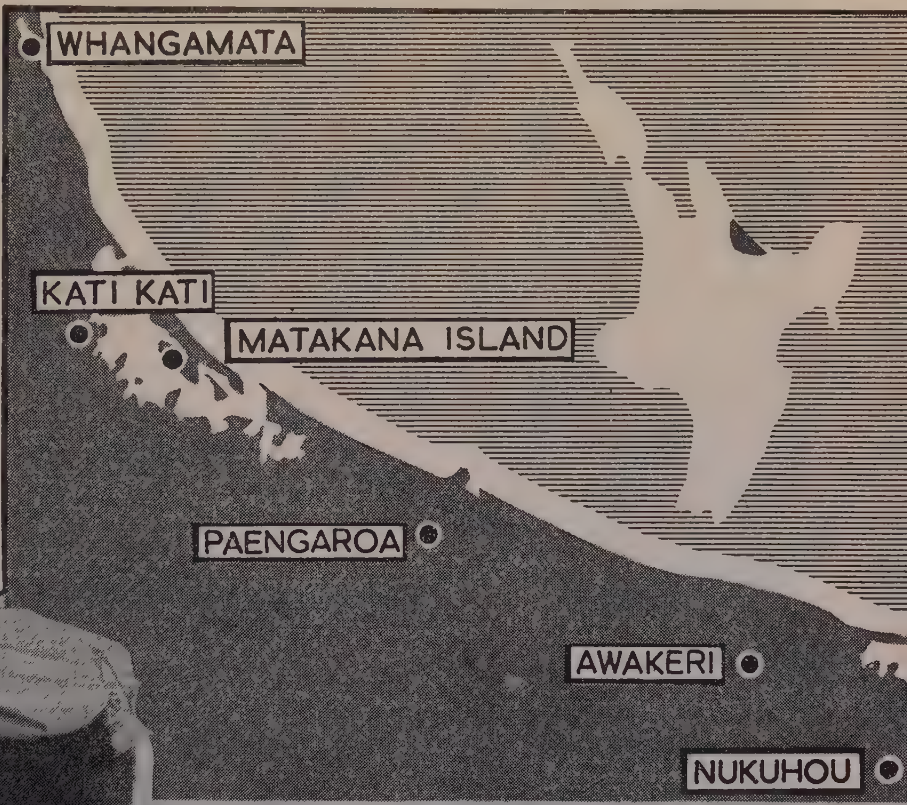
"We will continue to rely on the breeding animal and grass as the mainstay of our farming. There is no country in the world that can produce animal products with less human effort," Mr. Smallfield said in considering future development, particularly in the Bay of Plenty. "The demand will be there for all our produce. The time is long past when we can afford to neglect land that can be brought into production."

He did not think there was any best method for the development of fern and scrub land. Every bit of virgin land had to be considered on its merits. Where land could be ploughed the best way was to plough. On light land such as that in the Bay of Plenty the aim should be consolidation. It was essential that the seed-bed should be firm, moist, and warm.

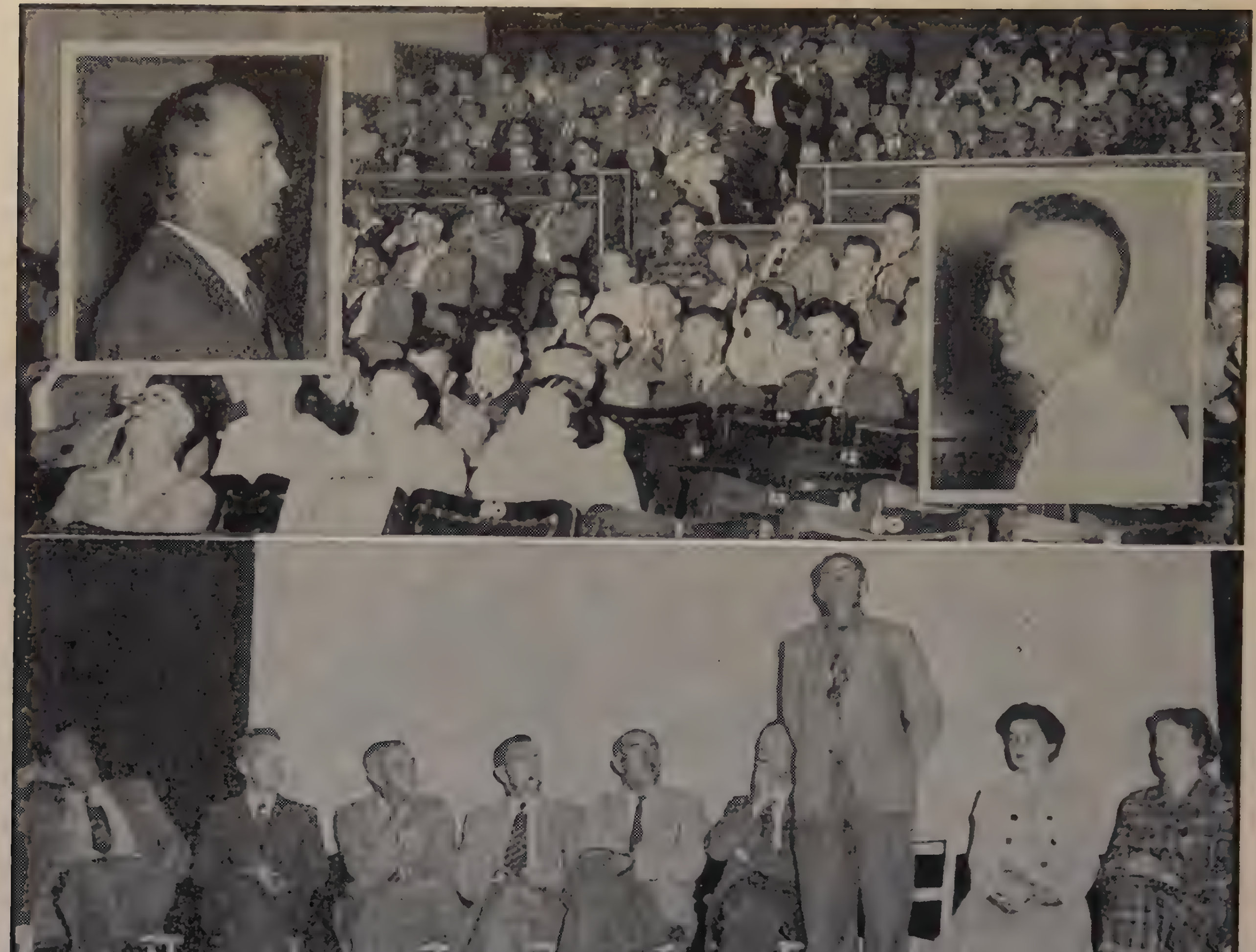
Potash deficiency was one of the main things to look at in the Bay of Plenty in the improvement of land at present in production. Any patchiness in pastures, particularly in spring, indicated potash deficiency and the Instructor in Agriculture should be consulted. By and large considerably more potash could be used in the area. Short-rotation ryegrass should be introduced into more dairy pastures.

"The solution of soil fertility problems," said Mr. Smallfield, "is a matter of co-operation between the farmer, the Instructor in Agriculture, and the research station. Soil fertility is very transient. The problems of 30 years ago are not those of today, nor are today's what they will be in 30 years' time. Your soil problems must be solved locally in association with the Instructor."

Should diversification of production be demanded in the future, it could be achieved in the Bay of Plenty. The proof of a good climate was that maize came to perfection in it and there was



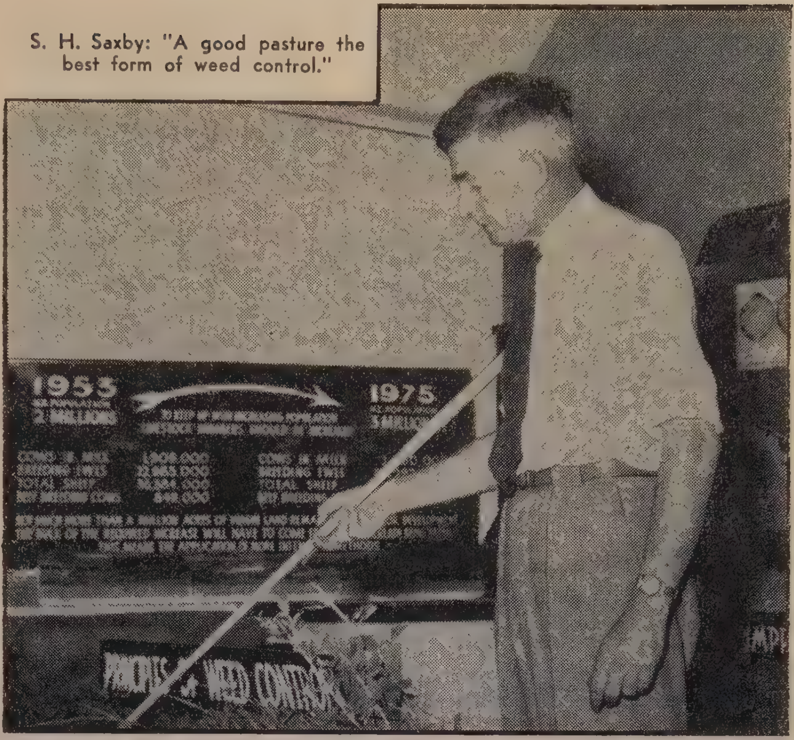
DEPARTMENT OF AGRICULTURE



Upper—A Katikati quiz session challenged the panel with questions late into the night. Inset left—Mr. G. A. Walsh: "Eyes on a virgin horizon." Inset right—Mr. N. Stone, Katikati: "A big thank-you to the Department" on behalf of Federated Farmers. Middle—Some of the panel from left, J. Mitchell, F. McIntosh, M. B. MacKenzie, A. V. Allo, H. Woodyear-Smith (quizmaster), E. H. Arnold, I. L. Elliott, Joanna Lockie, Daphne Eilers. Lower—Women speakers' audience at Katikati.

no doubt that maize could be grown in the district. With increasing population there would be a demand for more fruit and vegetables, and besides the fruit that would be required in addition to that already grown in the Bay, there would be considerable expansion in market gardening. This would mean that land would be withdrawn from livestock farming and there would be greater demands on that remaining in that use.

"People today have confidence in land development," Mr. Smallfield concluded. "In studying the requirements of another million population in 25 years' time, we can see what a tall order faces us. Science and practice have accomplished a great deal, but much remains to be done."



S. H. Saxby: "A good pasture the best form of weed control."

Wonderful Field for Expansion

"This Farm School aims particularly at carrying knowledge to young farmers, especially those organised under the Federation of Young Farmers' Clubs," said Mr. G. A. Walsh, member of Parliament for Tauranga, in officially opening the tour of the school at a crowded theatre in Katikati. "If we have one responsibility above all others, it is to show the young people which way to go."

Farmers of the district had shown great willingness to keep in line with agricultural progress, but he felt that the real potential strength of the district was not being realised as it might be. The average Bay of Plenty farmer struggled against considerable difficulties. Transport and fertiliser costs were high. Stock was of a quality that would hold its own against any, though it was not of the same numerical strength as in other parts of the country. Dairying was well advanced, but far behind the potential.

"From Tauranga to Rotorua and Taupo there is a wonderful field for expansion. Not many realise what has been done and what could be done in the next 8 or 9 years. There is a great deal of idle land that could be brought into production."

In referring to the incentive to increased production offered by tax concessions on land development work, Mr. Walsh said that often a farmer after working for years on up to 100 acres felt he could advance and develop more land. Such farmers were able to deduct in full for income tax purposes all expenditure on clearing, tilling, and grassing. Last year over 50,000 acres had been broken in by private people. The total addition to New Zealand's grassland last year was 110,000 acres.

The Minister of Lands had given expression to a plan of land development progress which was expected to add over 1000 new farmers on new land in the next 10 years.

In referring to the land utilisation survey completed in Northland, which gave a total measurement of that area and enabled assessment of its potential, Mr. Walsh said the survey was now in the Rotorua area and in the last 12 months had covered two counties entirely and was now in the third. It was likely that eyes would be turned toward the Bay of Plenty.

"How long do we await this virgin land on our skyline," he said, "and how much of it is there? A great deal at the back of Katikati is Maori land and the Maori Affairs Department is active in it. Coromandel on the eastern side of the peninsula is in pretty full production as far as Maori land is concerned. There are 50,000 acres lying idle between Tauranga and Rotorua. Another million acres or so round Taupo and Waimarino are perhaps not economic to develop.

"We in the Bay of Plenty are fortunate that our land is adapted to a wide range of farm production. Whatever we like to be as farmers we can enjoy it here."

The whole of the sheep industry in the Bay was in the modest early stages. The total sheep in Tauranga County, 170,000, was a long way short of Matamata County's 550,000. "There

Subjects and Speakers

"Farm Improvement", E. H. Arnold, Assistant Fields Superintendent, Department of Agriculture, Auckland.

"Pasture Improvement", A. V. Allo, Instructor in Agriculture, Department of Agriculture, Tauranga, and S. R. Hewitt, Instructor in Agriculture, Whakatane.

"Principles of Weed Control", S. H. Saxby, Agrostologist, Department of Agriculture, Wellington.

"Trace Elements in Agriculture", I. L. Elliott, Assistant Superintendent, Department of Agriculture's Rukuhia Soil Research Station, Hamilton.

"Rearing and Management of Young Stock", M. B. MacKenzie, Livestock Instructor, Department of Agriculture, Tauranga, and K. Wilson, Livestock Instructor, Opotiki.

"Stock Troubles", D. W. Caldwell, Veterinarian, Department of Agriculture, Hamilton, and F. McIntosh, Veterinarian, Katikati Co-op. Dairy Co.

"Cleaning Milking Machines and New Type Detergents", J. Mitchell, Farm Dairy Instructor, Department of Agriculture, Tauranga.

"Parasites of Stock", D. W. Caldwell, F. McIntosh, G. V. Wallace, Veterinarian, Department of Agriculture, Auckland, and I. Davison, Veterinarian, Auckland.

"Pig Points", I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington.

Women's School

"Sweet Making" (demonstration), "Renovating Old Chairs", and "Diet and Your Weight", Nell Macpherson, Field Officer in Rural Sociology, Department of Agriculture, Auckland.

"The Vegetable Garden" and "The Flower Garden", Joanna Lockie, Horticultural Instructor, Department of Agriculture, Auckland.

"Safety in the Home", and "Royal and Almond Icing" (demonstration), Daphne Eilers, Field Officer in Rural Sociology, Department of Agriculture, Auckland.

"Food Handling", Elizabeth Charleston, Health Education Officer, Department of Health, Auckland.

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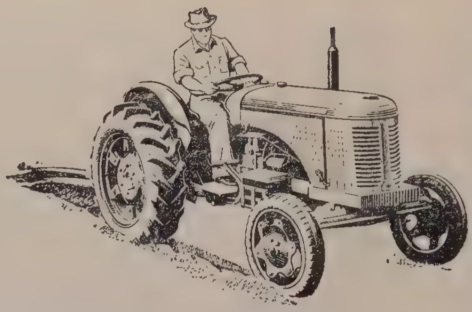

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I. L. Elliott: "Shotgun" fertiliser mixtures a shot in the dark causing a big hole in the pocket.

are not enough sheep in the whole of the county over to Opotiki to fill one freezing works. We have a long way to go to warrant a freezing works. Fertiliser works must come first. The project has got so far that an investigating company has lodged an application for 15 acres of land at the new port. The aim is a production of 100,000 tons of fertiliser a year. The works will have to be built at great cost, but will mean a big increase in phosphatic fertilisers available locally. Provision of money and plant is being discussed.

"With the servicing of the port fully provided for and fertiliser works established, Bay of Plenty production right through to Taupo and Waimarino will quadruple—nay, may be sevenfold," Mr. Walsh concluded.

Questions at Quiz Sessions

The scope of the school's repertoire is indicated by the list of subjects and speakers on page 439. The addresses were usually spread over morning and afternoon sessions on two successive days at each centre visited, and usually on the second night a quiz session with a panel of all the speakers was held after a programme of educational films. The challenge of the quizmaster, Mr. H. Woodyear-Smith, that the panel could answer or get the answer to any question was taken up spiritedly and pursued late into the night.

Some random samples of questions, indicating district problems, and answers, indicating the panel's treatment of them, follow:—

Fodder Beet—could it be recommended as a crop for the Bay?

It is a cross between sugar beet and mangolds, but very much easier to pull than mangolds. Though turnips have a lower feeding value, they are much easier to grow. It would most probably be found that turnips were a better proposition on dairy farms, but for pigs fodder beet is quite a good crop.

Potash—excess causing infertility in stock?

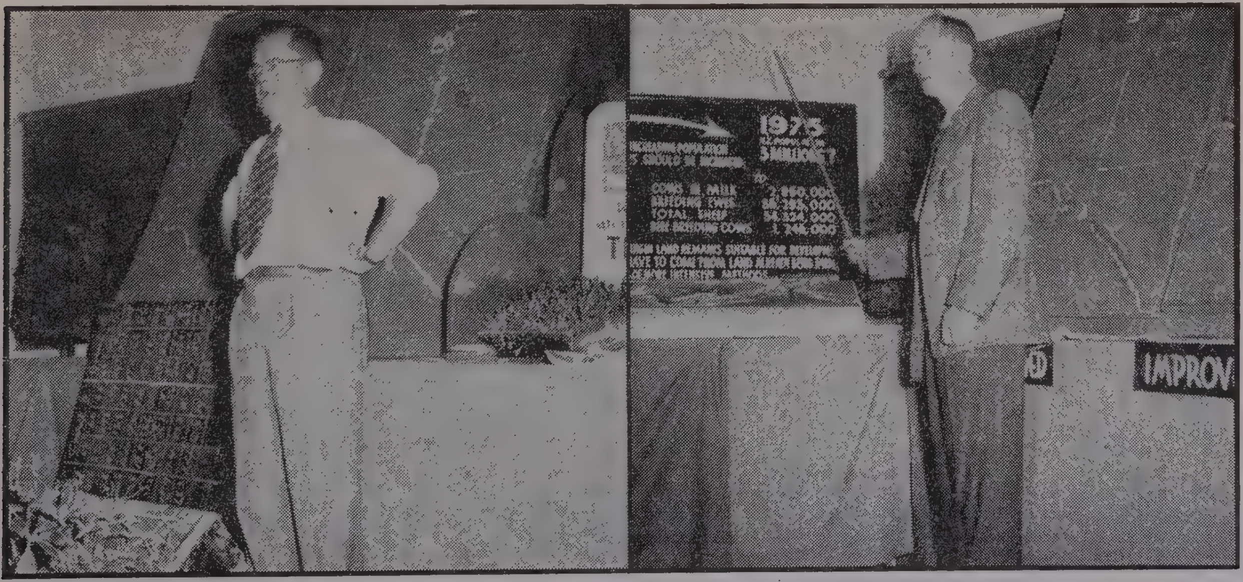
A lot of soil samples had been taken in the county and potash levels were not high anywhere. Most farms had normal levels; some were low, but never were they too high.

Danish Stock Lick—claimed to cure contagious abortion?

It would be just as effective in curing pains in the back. It could not be spoken too strongly against and farmers should be very careful.

Copper—its use recommended on onions?

The amounts of copper normally used to control copper deficiency in stock (5lb. per acre) were very low. Very heavy amounts were used in crops—50lb. per acre in maize, and it might be necessary to go to 100lb.



Left—A. V. Allo: The right road to high-producing pastures is more manure, better subdivision, and better grazing management. Right—E. H. Arnold: A picture of future improvement by methods that could be used by any farmer.

THE WOMEN'S SCHOOL

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KEEP
FOOD SAFE
2

Adam at Rukuhia went up as high as 400lb. It would be more effective to spray copper sulphate than to apply copper to the soil. Copper for stock was applied at such low rates that it would probably have no effect on plant growth.

Copper has been used on onions at Marshland on peaty soil and at Hamilton on Rukuhia peat. If copper were going to be tried on the soil, it should be restricted to peats. If in any area where there had been heavy applications of copper for a crop the land were turned back to grass, there would be no toxic effect on stock.

A man who for 7 years had been spraying his orchard with copper sulphate found his stock becoming ill and the livers showed high concentration of copper. The stock grazing the grass under the trees had been getting the run-off from the spray.

On peats heavy applications of copper could be made, as peat had a capacity for fixing copper. Research was at a very early stage and more information was needed on copper uptake in plants.

Lucerne—its use in the Bay of Plenty?

No one would argue against the fact that lucerne could be grown in the Bay. Those who had lucerne during the recent drought were pleased with the results.

It did give trouble in establishment, which was difficult, particularly in wet seasons, because of weed competition. One farmer who had very extensive infestation lost his crop last season. Lucerne demanded a very carefully prepared seed-bed, riddance of weeds, and liberal fertilising. It should be sown in autumn rather than spring to beat the weeds. It was a crop that should be grown more widely in the county.

Soil-testing Kits—do they give accurate indication of elements available to plants?

They were of very little value. A lot of kits being sold to farmers were supposed to tell what the pH was and they used pH only as a guide to the necessity for liming. Dyestuffs in the kits produced a certain colour during tests, but they could be absorbed by substances in the soil and when the results they indicated were tested against standard soil-testing procedures they could be well astray. Many years had been spent in sorting out the technique used in the Department's service, and though it was still not perfect, there was a good degree of correlation. If the results could have been got with kit sets, it would have been foolish to have spent so much time on the research by which the standard test the Department used had been evolved. The only men who could effectively interpret the findings of soil testing at Rukuhia were the Instructors in their districts.

Illustrations opposite: 1—Nell Macpherson (left) has a post-lecture consultation on a culinary problem at Katikati. 2—Elizabeth Charleston: "Many common ailments lead a hand-to-mouth existence." 3—Joanna Lockie makes hard grafting easy for a gardening audience. 4—Katikati youngsters study some of the dangers of the home. 5—Matakana Island schoolgirls come to see Daphne Eilers (6) ice a cake. Several of the women lecturers spoke at schools and at meetings of horticultural and women's organisations during the tour.

An important difficulty for the farmer attempting to take his own samples for kit testing was the getting of an uncontaminated sample. Experience was required. The farmer would get a better service by having the job done properly by the Department than he would by buying an outfit of his own and setting up as a research chemist in the kitchen.

Transparent Milk Rubbers—value as milk flow indicators?

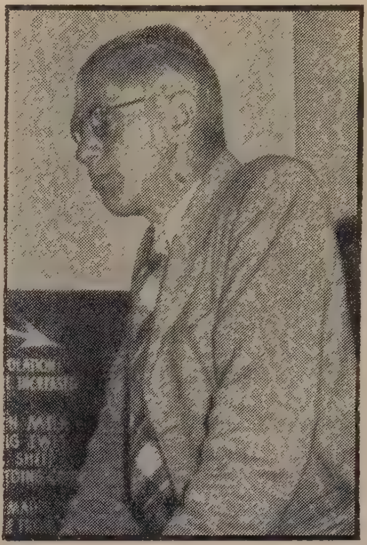
Experiments at Ruakura Animal Research Station had shown transparent plastic rubbers to be unsatisfactory. They were quite white and clear at first, but cracked inside and went a milky colour, then pink, in use. They could not be seen through and were no use as a flow indicator. The cracks developed and the pipes became insanitary. There was nothing satisfactory yet but rubber, though experiments were proceeding.

Long-rotation Ryegrass—better to wait for its development or use short-rotation?

Go ahead with short-rotation in a dairying district like Tauranga County. Long-rotation would not be vastly different. Breeding was a long job. The type might be changed. Short-rotation was very different now from what it was when first released. Both short- and long-rotation were hybrids between perennial and Italian ryegrass. Short-rotation at first tended toward the Italian side, but now verged toward the perennial. Long-rotation would probably go more toward the perennial. Certainly farmers should not refrain from the use of short-rotation while awaiting release of the long-rotation strain.

F. McIntosh: Wastage through nutritional diseases of cattle mainly due to faulty management of pastures.

Those who had grown short-rotation under good conditions could testify to the value of good short-rotation ryegrass in spring, which repaid its sowing many times over.



M. B. MacKenzie: A calf worth raising at all is worth raising well.

Basic Slag—any possibility that it had advantages over superphosphate or serpentine superphosphate and was feed produced by basic slag more palatable?

People often said basic slag had very great value because of its content other than phosphates. There was nothing in claims that there were effects other than those from the lime and phosphate. There was some room for a little doubt in that vanadium in slag might have an effect on the availability of other substances in the soil.

Slag was very popular, and rightly so, in districts of high rainfall on acid soils, particularly where lime was not available. With the increase in use and greater availability of lime, better results were being secured with the use of lime. The cost of slag put its use out of the question when lime was available.

Some slag contained molybdenum and on the more deficient soils of Northland some were beginning to think responses being obtained with slag applications might be due to the molybdenum content. So far as was known there was no place for the use of slag in the Tauranga area, where the local Instructor had never once in 16 years seen a response from slag anywhere comparable to that from serpentine superphosphate or superphosphate.

Clovers—are they susceptible to hormones?

Clover with a fair amount of growth on did receive a check, and should be grazed well down before hormones were applied.

Bloat Control—should serpentine superphosphate or superphosphate be applied in autumn or spring?

Bloat occurred in stock grazing short, rapidly growing grass and it was better to have the pasture more mature.

Bloat had been seen in the north on paddocks receiving all kinds of fertilisers, and particularly those stimulat-

MATAKANA ISLAND

ing clover. It depended on management. If management of the pastures stimulated the clovers, bloat occurred.

Bloat would not occur on autumn-saved pasture or mature feed. Topdress in autumn paddocks intended for autumn-saved grass. Spring topdress the paddocks the cows were wintered on. They would be clovery in spring, so they should be made the paddocks to be saved for silage.

Potash encouraged clover growth and if its application were combined with pasture management that encouraged clover, bloat would occur.

Twitch—any treatment possible to get rid of it when ploughing from grass to grass?

Plough the paddock and apply T.C.A. at 30lb. per acre. Spray on with a boom, preferably just before a good rain. It was no earthly use applying it in the middle of a drought; it was worth while only if the soil was moist or the forecast was for rain. It was no use on an unploughed paddock, when it would only brown the grass and the twitch would come up again.

If a paddock was being ploughed from grass to grass, T.C.A. application should not be necessary, as a good pasture should be able to compete with the twitch. The T.C.A. treatment was recommended, however, if a lucerne crop were to be sown.

If T.C.A. were used, it should be applied in autumn and the paddock winter fallowed until the following spring.

Green Vegetable Bug—how was it combated?

Hexone, a contact spray, at 1 teaspoonful to a gallon of water would kill it, but was fatal only to those bugs contacted. A parasite had been introduced which laid its eggs inside the eggs of the bug, and it should come into the district in the next 3 years. Care should be taken not to inhale the hexone or to smoke during its application, and any left over should be buried. Vegetables on which the spray was applied could be eaten 48 hours after. It was quite safe on beans, but not on tomatoes.

In-pig Sows—is good pasture good feed for them?

Good clover pasture was of valuable assistance to in-pig sows, but was not enough on its own. Pasture to be any good at all had to be very very good and such pasture in winter was not very common.

Pinus Sawdust—any value dug into the home garden?

It was perfectly satisfactory, and if it could be worked through the compost heap that was all to the good. Fresh sawdust applied to the soil would cause temporary starvation, which could be offset by a good dressing of blood and bone. Sawdust was best applied as a mulch up to 3in. deep.

Illustrations opposite: Upper left—The show truck going aboard the barge at Tauranga for the trip to Matakana Island. Upper right, middle, and lower left—Members of the island's Young Farmers' Club helping to tranship the school to the meeting house and hall (lower right). Staff of the island's school have given enthusiastic encouragement to the agricultural progress of the island farmers and discussed the value of the farm schools' visits with departmental officers.

Sodbound Paspalum—should it be broken up or is paspalum the best grass for the district?

Paspalum was one of the grasses the district should grow, but if it were sodbound it was no good.

Sodbound paspalum should be ploughed, two crops taken, and the paddock put back into grass, or ploughed and put straight back into grass. Other grasses should be put in to supplement the ryegrasses, white clover, etc.

Ryegrasses and white clover were being grown with paspalum in the north and this association with good grasses was the answer. In sheltered valleys and on flats nothing would outyield paspalum, but fertility conditions must be right and management correct.

A visitor from Israel to New Zealand had been amazed that it was possible to get in one pasture ryegrass producing in spring and paspalum producing in summer. Bringing ryegrass into a paspalum sward gave early and late feed.

Paspalum as a Species—has there been any work on attempting to improve it?

There had been no work on strain selection of paspalum in New Zealand. The Grasslands Division's programme was mapped for a good long way ahead and the Director had to work out priorities. Paspalum was not considered one of the most important. Work at present would have to be done in Palmerston North. Everybody would agree work on paspalum should be done in the north and it would have to be assured that there would be a demand for improved paspalum. Where would one sow paspalum to avoid deterioration through crossing with inferior strains? Harvesting also was tricky, as there was a good deal of seed damage.

One quite often heard condemnation of paspalum. It took years of investigation to produce short-rotation ryegrass, and some of the other ryegrasses, and years for cocksfoot. Some work should be done on paspalum so that some of the higher-producing strains that are within the strains in general use could be developed. The district would not produce the butterfat it did without paspalum.

Grassing Sandy Weekend Sections—would kikuyu grass be any good?

If a grass that would stand and wear well were the aim, nothing better than kikuyu could be suggested, but whether the neighbours would approve would be another matter. On pure sand there was not much else that would grow. Edges of the border should be trimmed and runners chopped out. An alternative to kikuyu would be to make the Indian doub that was in the district grow better. It was all round the flats already and there should be no difficulty in getting it to grow.

On the other hand, why not go half way and grow buffalo grass? It was drought resisting and would grow on almost pure sand. It did not have the vicious habits of kikuyu, but was a firm and hard-wearing grass.

Rubber Rings—for dehorning adult stock?

The practice was thoroughly bad and imposed a lot of pain. The rings slipped up and did not dehorn. Nearly every horn had to be knocked off in the end. The guillotine was more spectacular and appeared to give pain, but was infinitely to be preferred.

Manuka Blight—if it exterminated red manuka, would not some other native take its place?

As a generalisation something would take its place. Very little ground anywhere was permanently bare. In some places in Wairoa where the younger manuka was dying out and the area was topdressed the manuka was being replaced by good pasture. In other places inferior grasses—danthonia, fog, etc.—were coming in. In others again other natives were taking over. In some places the manuka was replaced by brier, blackberry, etc., but only where farmers were not getting on to the country and improving it. Where farmers were following the blight up with pasture improvement or grazing, pasture was replacing the manuka. What would replace manuka would depend on what the farmer did and what there was there to replace the manuka. It was possible that if manuka were killed on the Central Plateau, tussock would take over. There was an area in the South Island, on the other hand, where in burnt tussock country manuka had taken over from the tussock.

Land under *Pinus radiata*—could it be farmed after the timber had been taken off?

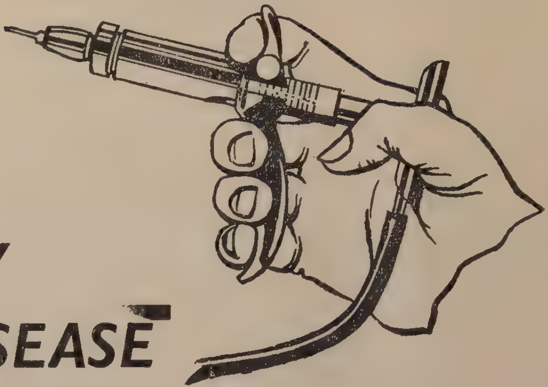
Whether land under pinus forest was suitable for farming depended on the time it had been under trees. In this district there was an impression that one crop of pines would not render it unsuitable for pasture. In the Tokoroa and Lichfield areas where land had been released it was coming into grass quite well, though not as quickly as land that had not been under pines. There was no reason in this district why such land should not carry grass.

Farm Improvement Stimulus

Figures of results from the Waikato Farm Improvement Scheme (published in the March issue of the "Journal") were used as the basis of the first paper, "Farm Improvement", at each farm school.

"The most striking thing that emerges from these farm improvement schemes," Mr. Smallfield remarked at Katikati, "is that it is the simple things that get results, things that every good farmer knows and has known for years. But it seems as if they have to get into an improvement scheme to make them yield outstanding results."

The addresses at the schools were on these simple things that have evolved from the science of the Department and the practice of the good farmers in co-operation with its extension officers. Most of the men who delivered the addresses were extension officers who move individually among farmers every day urging the same principles of farm practice



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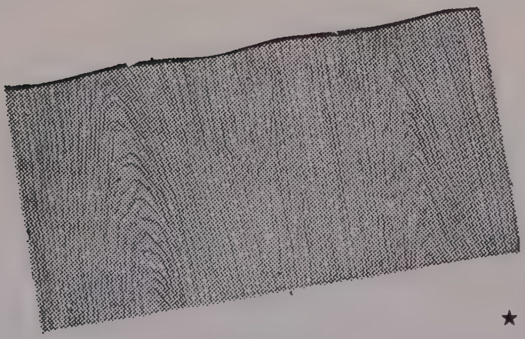

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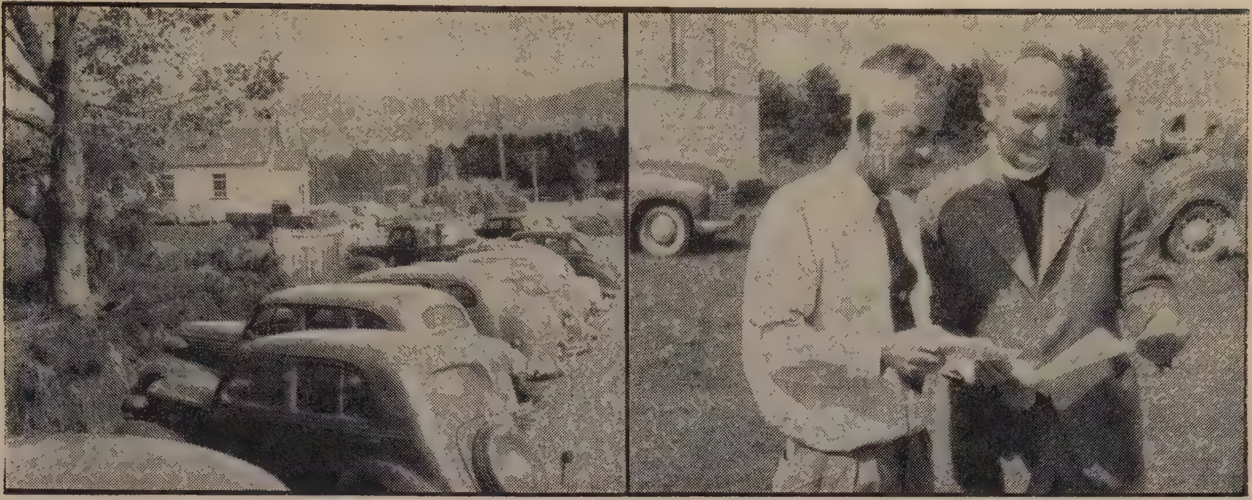

Left—Attendances of farmers at the school at Katikati promise that improvement of the "wild, uncultivated land" will be a continuing process. Right—Mr. N. Stone, Federated Farmers, and the Rev. A. A. Wright, vicar of Katikati, share an interest in flock improvement.

and pasture and livestock management.

The impressive thing about the schools was the large attendances of farmers—all the farmers in the district at Whangamata and record attendances at Katikati—and the feeling created by the schools of a concerted aim instead of a piecemeal effort.

The results from farm improvement schemes that have been started to date show sufficient increases in production to warrant optimism regarding another theme of this Farm School—the attainment of the additional production required for another million population expected by 1975.

Availability of technical staff to operate them is at present the obvious limitation to the extent to which requests for the establishment of farm improvement schemes can be met. Farm Schools, in assembling in the farmers' own districts a complete range of technical advice in a concentrated form, appear to be an effective stimulus in an otherwise piecemeal extension service.

Requests for schools to return to a district are persistent and in districts where the schools' visits are most appreciated the upward spiral of production is most marked. Since the school's visit to Matakana Island 3 years ago the Maori farmers there have rapidly improved their farming methods under the guidance of the Department's Instructor at Tauranga.

Credits to the School

In referring at Matakana Island to the effectiveness of the methods recommended by the Department's extension officers Mr. Woodyear-Smith quoted results on a number of properties in the Auckland Province. They included:—

Near Kaitaia

A farm milking 240 cows in two herds; not well farmed and the milking times haphazard.

Total butterfat in 1949-50, 39,000lb.

There had never been an Instructor on the farm and the lessons of a farm school had never been applied.

The owners came to Auckland in 1950 and met the Department's Instructors. They returned to their farm and started doing the things recommended.

Last season their butterfat production was 81,000lb.—from 39,000lb. to 81,000lb. in three seasons. This illustrated what could be done on no more land where more stock had to be run to control the feed. The lesson: Good feed into good stomachs.

Below Auckland

A farm of 58½ acres bought in 1947.

In the first year butterfat production was 4800lb.

Pastures, stock, and sheds were poor.

The owner, following the lessons for 7 years, reached 17,000lb. of butterfat last season.

If one had looked at the country before improvement was started, one would have said it was no good. The owner had done the work with little money.

Tokoroa

A farm of 110 acres, not good and poorly run, taken over by a young returned man in 1949. Keen on the precepts of the Department of Agriculture's extension officers, he raised production from 11,400lb. of butterfat in his first season to 23,000lb. last season and more than doubled his income.

Matamata

A property of 113½ acres owned by an old farmer who was doing all the things recommended by the Farm School.

Last season he milked 101 cows. He carries all replacements and has done the same for many years.

"On the sheep side there are just as good cases," Mr. Woodyear-Smith said. "These men are not doing these things for one year only; they are doing them every year. If you can follow these men's recommendations, with your good soil and climate you can do the same, not just for one year but all the time. The answer is good pastures well managed; good stock well managed; and regular milking."

Telling the Farmer

If the measure of the efficiency of an extension service is the results on the farm, the record for the Bay of Plenty appears good. Mr. Smallfield's review of a 30-year period in his address at Katikati revealed a steady improvement in production summarised in an increase in carrying capacity from 2.2 ewe equivalents in 1922 to 4.9 ewe equivalents in 1952.

If the yardstick is the extent to which problems have been met and countered, the record is again good. The first problem was to get good pastures and these started to come after the first urgings in 1922 to sow superphosphate to bring on white clovers in the sward. From then on the wilderness began to recede. An answer to bush sickness had to wait until 1935, but in the meantime Certified seeds had come with a scheme that as a co-operative effort between the Department, merchants, and farmers was unexcelled.

Bloat and facial eczema are livestock problems still awaiting solution, but while research continues on them the Department is able to recommend effective control measures through management.

Finally, the extension service must claim some credit in the reputation of New Zealand farmers for being among the most receptive in the world.

If there is no other country that can produce animal products with less human effort than New Zealand can, how much easier is it in the kindly climate of the Bay of Plenty? The answer may be in the remark of the vicar of Katikati, who said, "Too kindly; if we don't do it in the autumn or the spring we don't get round to it."

But with or without the assistance of extension services, the farmers in the district seem to have got round to a lot of production since the days of Mrs. Hugh Stewart's "wild, uncultivated land", and there seems to be plenty of determination on both sides not to let it stop at that.

Photographs by Rendell's and departmental officers.

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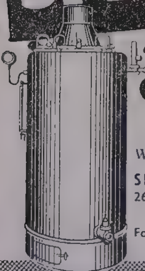

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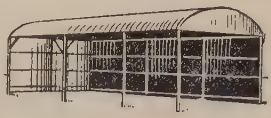

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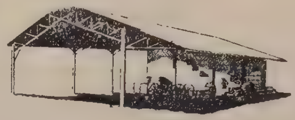

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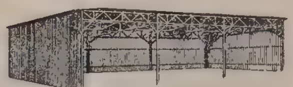

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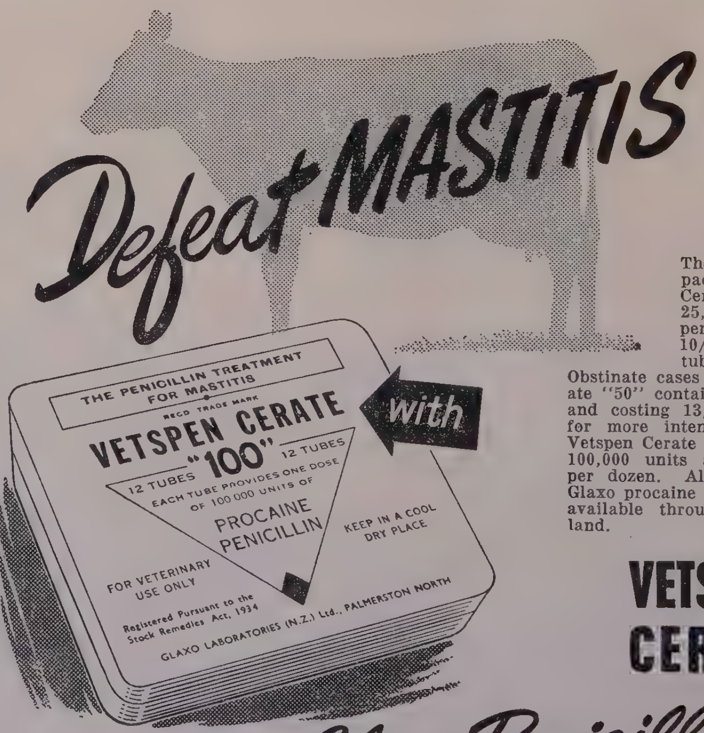
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HEADING PHOTOGRAPH: Threshing a first-year crop of perennial ryegrass with a pick-up header.

Specialised Small Seed Production on Marlborough Farm

By W. R. CRAWFORD, Fields Instructor, Department of Agriculture, Blenheim

BECAUSE of the high incidence of sunshine and the dry summer normally experienced, the lower Wairau Valley, close to Blenheim, is particularly suited to the growth and harvesting of high-class seeds. In this area seed production of one type or another usually forms an important part of the income on most farms. On some properties cereals and peas are the main crops grown; other farmers specialise in small seeds production. A farm representative of the latter group and in the lower Wairau district approximately 4 miles from Blenheim is described in this article.

THOUGH the consistently high returns secured from crops on this property are undoubtedly due to general sound farm management, the two factors of intelligent utilisation of different crop rotations to achieve different ends and careful attention to detail are of particular importance.

Previous Type of Farming

Before the present system of management was begun the property under discussion carried a dairy herd for some time. In earlier days the area was subject to frequent flooding from the Wairau and Opawa Rivers and dairying was the most reliable type of farming under these conditions. With the improvement in river control the way was opened to successful use of the property as a cropping unit, and this method of farming has proved an unqualified success under the present management.

Soils and Drainage

The soil is a deep Opawa silt loam, consisting of very recent alluvial deposits from greywacke overlying recent soils. The top 3in. is a dull yellow-brown silt loam covering 12in. of grey silt loam on a pale grey silt loam. The two last phases are recently buried topsoils.

These soils are reasonably well supplied with phosphate and lime and are fairly well drained, though in a wet season surface water is sometimes a problem. They are friable soils and no great difficulty is experienced in working them down to a fine tilth.

There is no system of underground drainage, as a deep ditch on either side of the property normally supplies adequate drainage. In seasons of exceptionally heavy rain, or when heavy falls occur in a short time, some trouble develops with surface water through water in ditches backing up from the rise in the rivers. However, provision is made to clear such surplus water by pumping from the ditches over the stop-bank. In a normal season this emergency does not arise, as the soils are naturally free draining and any excess water soon seeps away into the ditches.

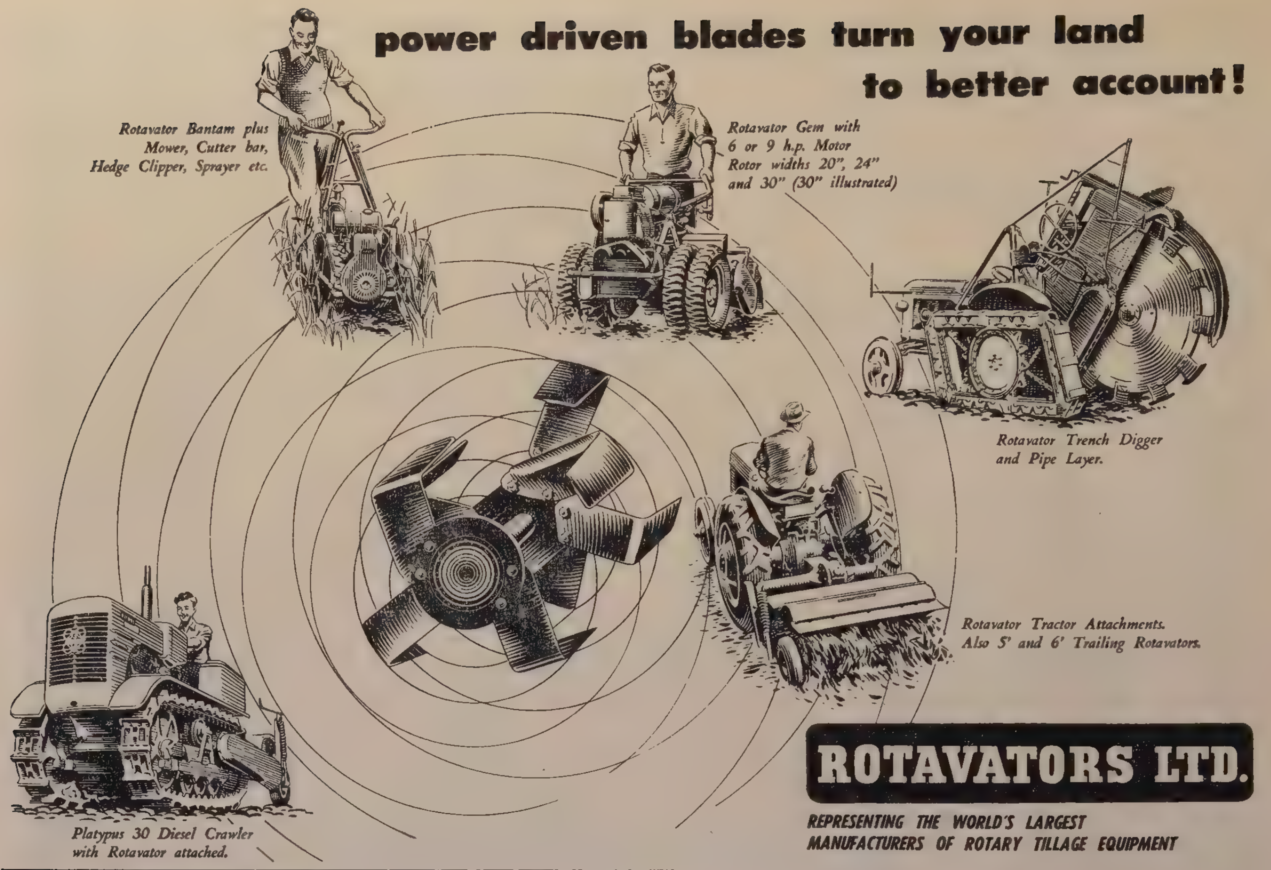
Climate

The climate of the lower Wairau Valley is ideally suited to the successful production of most farm and garden seeds. The average annual rainfall for the area is approximately 25in., the heaviest precipitation occurring from May to October, both months inclusive; the summer and autumn are normally fairly dry. Table 1 shows the distribution of average annual rainfall at Blenheim.

TABLE 1—AVERAGE MONTHLY RAINFALL AT BLENHEIM

	in.		in.
January	1.7	July	2.7
February ..	2.0	August	2.3
March	1.7	September ..	2.3
April	1.8	October ..	2.2
May	2.3	November ..	1.8
June	2.4	December ..	1.7

The relatively low rainfall in summer and autumn combined with the high average hours of bright sunshine and predominance of dry north-west winds is generally most suitable for



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the ripening and harvesting of all crops on the property.

The sowing of peas in 21in. drills allows inter-row cultivation to control weeds in the early stages of the crop.

Layout, Buildings, and Machinery

Of 104 acres of the farm 98 acres is croppable, 6 acres being taken up by ditches, plantations, a lane running through the property, and homestead and buildings. The area is divided into 14 paddocks, all of which are easily accessible from the lane.

The buildings of the farm comprise the homestead, a garage, a large manure and implement shed, a smaller store shed, and a dairy. The dairy is a relic of the previous type of farming and is now used only for odd storage purposes.

The water supply is drawn from three artesian bores, one of which is used for domestic purposes and the others for watering stock.

A large and comprehensive range of machinery and implements carried on the property includes the following: 5ft. pick-up header, 2 rubber-tyred 20 h.p. tractors, truck, rotary hoe, 3-furrow plough, stiff-tined cultivator, spring-tined cultivator, 8ft. Cambridge roller, set of heavy tine harrows, set of light tine harrows, row-crop cultivator, set of grass harrows, 15-coulter drill, 5ft. mower, side rake, hay sweep, hay stacker, horticultural tractor with all attachments, road grader, and one-stand portable shearing plant.

The shearing plant is shared with two neighbours. The overhead involved in this large range of equipment is naturally high, but possession of all machines required for normal operations on the property is essential. Certain operations such as harvesting must be carried out punctually and rapidly while weather conditions are suitable, and past experience has shown that all necessary machinery must be at hand if efficiency is to be attained and serious losses avoided.

Labour

The farm is worked by the owner and one permanent employee. Most of the work necessary to bring the harvesting of crops to a successful conclusion is done by these two, but casual labour is occasionally employed for the harvesting of some crops, such as onions.

Seed Production

The main crops grown on the farm for seed production each year are peas, wheat, perennial ryegrass, white clover, onions, and broad beans.

For the first 2 or 3 years after the property was taken over a small acreage of cowgrass was grown, but none has been saved since 1949. Other crops which have been grown occasionally for seed include sugar beet, cabbages, scarlet runner beans, and mangolds. The average annual acreages of the main crops grown over the 3 years up to the 1951-52 season, together with the average yield of machine-dressed seed, are given in Table 2.

TABLE 2—ACREAGES AND AVERAGE YIELDS OF MAIN SEED CROPS

Crop	Average acreage	*Av. yield per acre bushels
Peas (all varieties)	25	36
Wheat	6	58
Perennial ryegrass	26	40
Broad beans ..	8	25
White clover ..	15	165lb.
Onions	2	350lb.

* Machine dressed seed except for broad beans, for which the average yield has been estimated by the owner.

No set rotation is used, this varying according to season and demand for different kinds of seed. However, the principle of rotation is used to the full to produce maximum returns along the lines desired, and sound rotational practices are always adopted. The sowing of clover seed crops after wheat, for example, is sound practice, but if grass seed is desired, sowing down is done after peas. Similarly the very high average yield of peas is undoubtedly obtained largely through the standard practice of sowing this crop after grass.

The main rotations used are: Pasture 4 to 5 years, peas, wheat, clover for seed or pasture 4 to 5 years, peas, ryegrass for seed.

The owner makes no claim that plans never go awry, but there is little doubt that appropriate use of sound crop rotation principles goes a long way toward producing the desired results.

The certification of perennial ryegrass and white clover under the Department of Agriculture's seed certification scheme is an important part of the farm programme. No seed of a class lower than Pedigree is sown and Government Stock seed is used when available.

Nearly all the onion seed harvested on the property is grown under the seed certification scheme. Wheat harvested on the farm is not certified, but certified Mother or Standard seed is usually sown.

The management of the main seed crops from preparatory cultivation to harvesting is an important feature of the farm programme.

Peas

Peas are normally the first crop to follow old pasture. Only garden peas are grown, the main variety being William Massey, but occasionally Onward and Greenfeast are included.

To break up the old pasture turf and hasten its decomposition the paddock is first worked with the discs or cultivator, or more recently with the rotary hoe, before it is ploughed to a depth of 4 to 5in. in early August. After it has been left for about a month the breaking down of the furrow is done with the rotary hoe and the paddock is then harrowed and rolled once before sowing. From mid-September to early October the seed is drilled at the rate of 3½ to 4 bushels per acre in 21in. rows to facilitate

TABLE 3—ACREAGES OF VARIOUS CROPS, 1953-54

Crop	Acres
First-year perennial ryegrass for seed	32½
Second-year perennial ryegrass for seed	11½
Second-year white clover for seed	8
Peas (all varieties)	20
Onions for seed (Certified Pukekohe Long Keeper)	3
Scarlet runner beans	5
Pasture 3-4 years	14
*Rape	4

* This crop is not grown normally.

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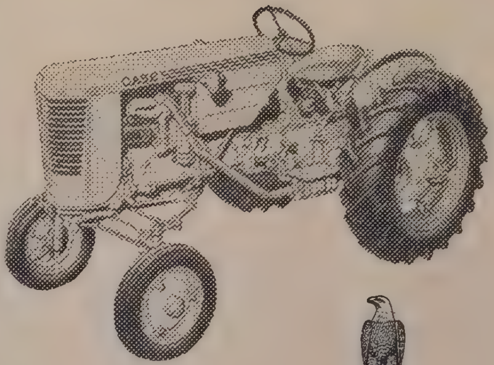

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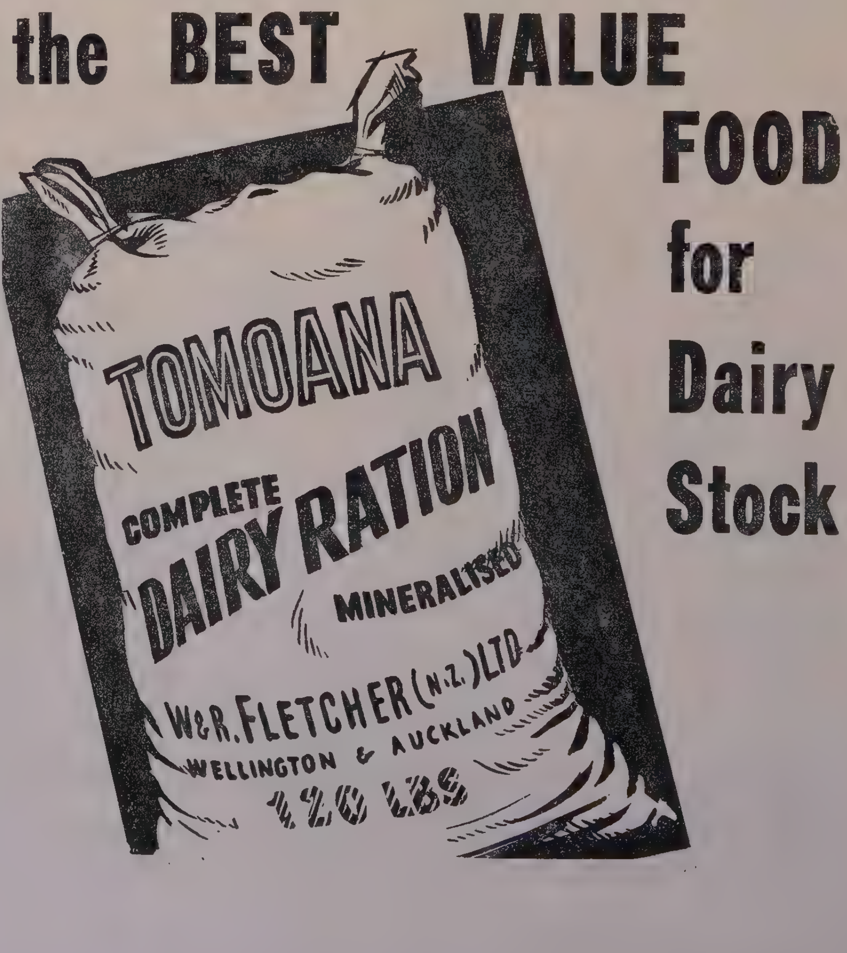

Crop of Certified Pukekohe Long Keeper onions at the early flowering stage. Mechanical cultivation (inset) is not possible after this stage and hand hoeing is normally necessary in the later stages of growth.

inter-row cultivation. Until the last two seasons no manure was sown with the seed, but in these seasons 1cwt. of superphosphate per acre was sown, though no marked differences in growth or seed yield have yet been observed.

The crop is inter-row cultivated twice to control weed growth and is also given one light harrowing when about 2 to 3in. high. When plants are about 4 to 5in. high they are sprayed with ½lb. per acre of an ammonium salt of D.N.B.P.

When the top pods are just past their best for table use the crop is cut with a mower and left in the swath for 14 or 15 days. With a heavy crop it is sometimes necessary to lift the swath by hand to facilitate drying. Harvesting is done with a pick-up header as soon as the crop is ready.

Sheep are turned out on to the pea straw after harvesting and left there for a period before cultivation is begun. If a heavy bulk of straw has been left in the paddock, it has sometimes been necessary to rake it up for burning before cultivation for the next crop begins. However, the usual practice is to work the pea straw back into the soil with the rotary hoe.

Wheat

Wheat always follows peas, the variety used being mainly Cross 7, but in the last 2 or 3 years Hilgendorf has been grown with good results. The straw from the pea crop is first worked into the soil with the rotary hoe, this being followed by the plough, set to a depth of 6in., about the end of March or beginning of April. The furrow remains unbroken for a month, after which the land is cultivated with the grubber and then harrowed and rolled before sowing. The seed is sown at 1½ bushels per acre about the middle of May to early June, no manure being drilled with it.

The crop is usually fed off twice (during late winter and in early spring), the last grazing being taken about the end of September. After the second grazing and when the wheat is about 10 to 12in. high it is sprayed for weed control with ½lb. per acre of an amine salt of 2,4-D.

The crop is direct headed, usually late in January if seasonal conditions are favourable, and the standing straw is then disposed of by burning before cultivation for the next crop begins.

Onions

Onions are not included in the crop rotation on the farm, but from 1 to 2 acres are grown each year. Small corners of paddocks or the smaller paddocks on the property are used for the crop, and the best areas on the farm are always selected.

Pukekohe Long Keeper bulbs eligible for entry into certification are always planted and the seed is normally certified.

The area selected for the crop is ploughed about 6in. deep in March and the paddock is then cultivated several times with the rotary hoe and cultivators. The bulbs are planted in June, about 25 to 30cwt. of bulbs per acre being the usual amount required. One bag per acre of blood and bone manure is usually sown at planting time.

To prepare land for planting a small furrow is formed with a tractor-drawn cultivator with all but three tines removed. The tines are about 3ft. apart and each is fitted with a large shoe. The bulbs are pressed by hand into this furrow, the distance between each bulb being about 1ft. The planting of the bulbs by this method facilitates later inter-row cultivation, which is very necessary in the early stages of growth.

The crop is inter-row cultivated two or three times, depending on weed growth, with the row-crop cultivator and at a later stage of growth 2 or 3 times with a horticultural tractor. When the plants become too large for mechanical cultivation to be carried out the crop is given one hand hoeing, which is generally sufficient to control weed growth and allow the crop to finish off satisfactorily.

As ripening takes place unevenly, harvesting is carried out in two stages. In late February or early March the ripe seed heads are cut and about a fortnight later the remaining heads are harvested. All this work is done by hand, the heads being placed in sacks as they are cut. The sacks are only partly filled and are hung on fence-lines for about 10 days. This allows the heads to "sweat" slightly and facilitates threshing. The heads are then spread evenly on a tarpaulin in the open and left to dry for about a week, provision being made for covering during rain. At the end of this period they are threshed with a header harvester.

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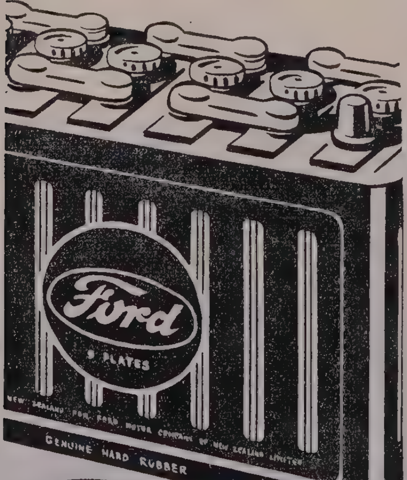
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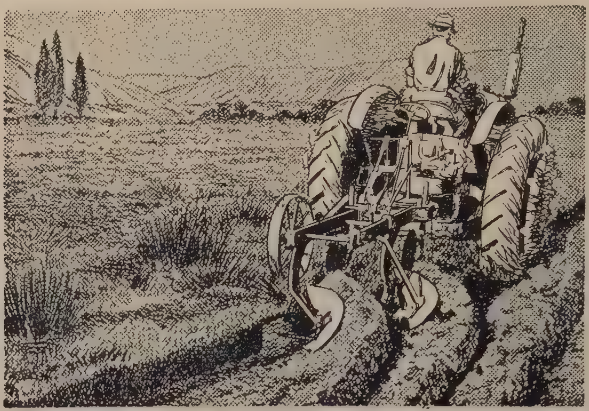

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The standing stalks left after the harvest are ploughed or rotary hoed as soon as possible after the cutting of the seed heads is completed.

Perennial Ryegrass and White Clover

Perennial ryegrass and white clover are the most important seed crops grown on the property. In the sowing down of paddocks to these crops the objective is always to harvest either ryegrass or white clover seed in the first season. If the aim is ryegrass in the first season, sowing down always takes place after peas, but if white clover is the crop wanted, the mixture is sown down after wheat and under a cover crop of oats.

Cultivation consists of breaking up the surface with the rotary hoe as soon as possible after the pea or wheat crop has been cleared. Pea stubble is generally worked back into the soil and wheat stubble is burnt before rotary hoeing. After the hoeing the paddock is left rough for about a month and then harrowed and rolled. It is then rotary hoed again, followed by further harrowing and rolling until a fine, firm seed-bed is obtained.

The mixture used is 1 to 1¼ bushels of perennial ryegrass and 2 to 3lb. of white clover per acre, sowing taking place in March. If the intention is to save white clover seed in the first harvest, the mixture is sown under a cover crop of 1½ bushels of Algerian oats.

Though grass-grub damage is not normally serious on the property, 1cwt. of D.D.T.-superphosphate per acre is always sown with the new pasture as a protective measure against this pest.

Newly sown paddocks are first lightly grazed with hoggets about the middle of May. When a good cover is secured after spelling, further light grazings with ewes and lambs are taken, until the third week in October if ryegrass seed is to be saved or until the second week in November if white clover is the objective.

Sulphate of ammonia at 1cwt. per acre has been used occasionally on ryegrass crops and although appreciably higher yields have been obtained in the first season, it has been found that poor second-year crops often follow, and the practice has not been continued during the last 2 or 3 years.

In late December or early January the perennial ryegrass crop is cut with an ordinary mower fitted with an inside grass board. The crop is left in the windrow for 5 to 8 days and then picked up and threshed with the header harvester. The straw left from the threshed crop is cleared from the paddock immediately by baling and fed to cattle brought on to the farm during winter.

Paddocks to be harvested for white clover seed are lightly grazed until the second week in November and then closed to stock.

White clover seed crops are cut with the mower, usually in January, but this varies considerably according to the season. The cut clover is left in the windrow to dry, and if seasonal conditions are suitable, it can be picked up and threshed with the header harvester in about a week. If wet weather is experienced after cutting, however, the crop may lie in the paddock for many weeks before it is dry enough to be threshed. Under these conditions it is often necessary to cut under windrows with a mower and to use a swath-lifter to facilitate drying of the windrows. The straw left after threshing is disposed of by grazing with a heavy stocking of sheep as soon as harvesting is completed.

Generally two and sometimes three ryegrass seed crops are taken from a paddock and these may be followed by a crop of white clover in the fourth year if conditions favour this procedure. When a paddock is sown down with the intention of taking white clover seed in the first harvest some ryegrass is harvested with the clover in the first season, and in the second year the aim is to produce a clover-dominant sward for a clover seed crop. If possible, another clover seed harvest is secured the following year.

Broad Beans

The saving of broad bean seed, as with that of onions, is not a part of the normal crop rotation on the property. The crop is sown in the smaller paddocks of the property, or when there is too large an area to be sown down to new grass the surplus ground is usually sown in broad beans. The crop is usually sown after peas and the preparatory cultivation consists of ploughing the paddocks about 6in. deep in early autumn, followed by cultivating, harrowing, and rolling.

In June the seed is sown in 20in. drills with a spoon-feed drill fitted with special, large spoons. The normal rate of seeding is 1 bushel (65lb.) per acre and the seed is sown with 1cwt. of superphosphate per acre. The crop is inter-row cultivated until it is about 6in. high. Cultivation past this stage is precluded by side growth between the rows.

In some seasons a great deal of trouble is experienced with aphides after the bottom pods have formed and the top ones are just beginning to form. In seasons when aphides are bad it is usually necessary to cut out the top of the plant to stop the spread of the pest from the top leaves to the bottom. This operation is done by hand with a reap hook.

Harvesting of the crop is much the same as for peas. Cutting takes place about the end of December and the crop is left in windrows for about 10 days to a fortnight, when it is picked up and threshed with the header harvester.

The straw is disposed of by grazing with sheep, followed by rotary hoeing of any residue.

Livestock

Livestock are carried on the property for approximately 11 months of the year. In addition to providing a valuable source of income through the sale of fat lambs, ewes, hoggets, and cattle the stock perform an important function in disposing of crop residues and in controlling pastures and preparing them for the coming seed harvest.

Sheep

Three Southdown rams are carried on the property. These are bought in and kept for 3 years.

About the end of January each year 150 full-mouth Romney ewes are bought privately. These are carried through until about the end of December, being grazed on old grass paddocks with run-off on to the new grass areas as growth permits. They are also fed hay from the straw of ryegrass and clover seed crops, and a cut of hay for feeding to the ewes is usually taken from one of the clover seed paddocks before it is closed.

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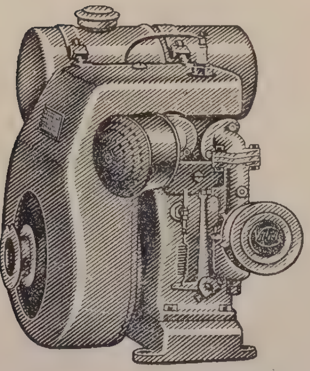

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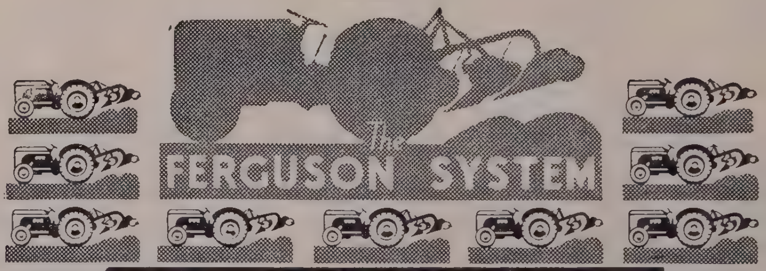

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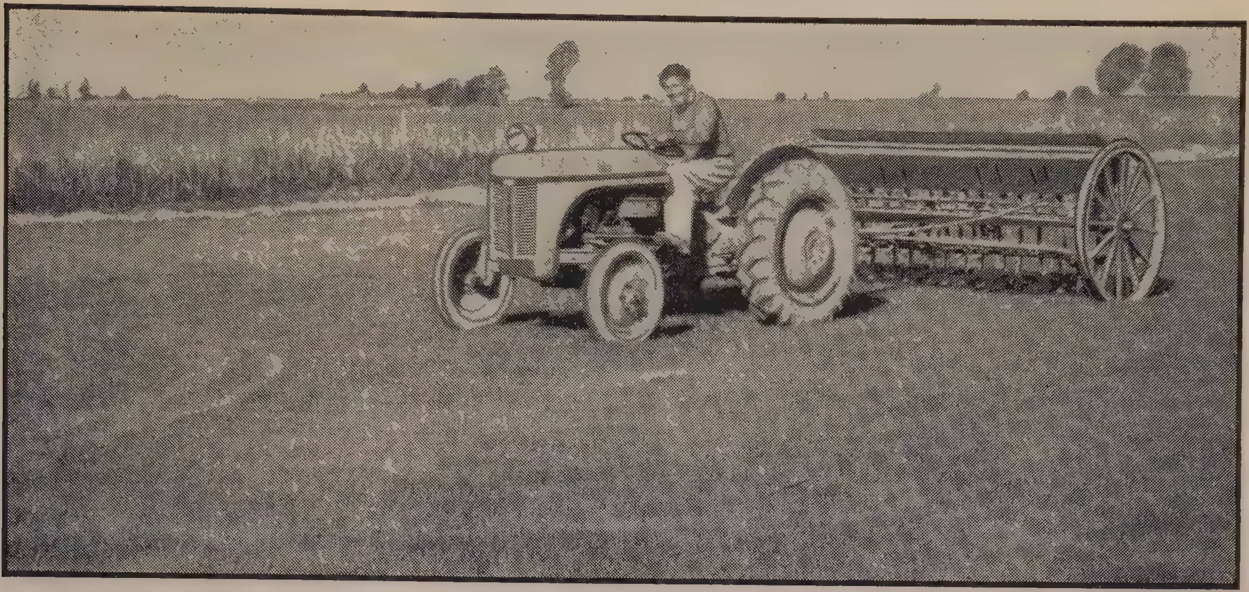


Topdressing a first-year ryegrass paddock with nitrogenous fertiliser.

The rams are turned out with the ewe flock about the third week in February and lambing usually begins early in August. After lambing, ewes and lambs are grazed on paddocks of new grass saved for this purpose. All lambs are sent away fat off the mothers, the first draft being dispatched about the beginning of December and a further draft about 3 weeks later. The average lambing percentage on the property over the last few years has been about 110.

All ewes are shorn about the middle of November, the average weight per fleece being 10lb. All ewes are disposed of about the end of December.

In addition to the ewes carried on the property about 150 hoggets are bought in about the end of January each year and carried over winter. The hoggets are shorn in August and sold fat in two drafts in late September and October.

Cattle

In May each year about 25 2-year-old black poll cattle are bought and wintered on the property. They are fed ryegrass straw and clover hay on the older grass paddocks and are carried through until about the third week of October, when they are sold either fat or in forward condition.

Pasture Management

The main purpose in the general management of pastures is the production of seed rather than feed. Maximum growth consistent with high yields of seed is naturally highly desired, because returns from stock are increased, but the main goal is seed.

Topdressing

All second-year and older pastures on the farm are topdressed with 1cwt. of superphosphate per acre in July or August of each year. Lime is applied to each paddock at 1 ton per acre in autumn immediately after the harvesting of a first-year crop of perennial ryegrass or white clover. No further dressings are given until the paddock is again sown down to pasture and a first-year crop of grass seed or clover is taken.

Grazing

Overstocking is avoided on the farm as a whole, but if heavy grazing is essential at any time, it is confined to the older paddocks. As the main objective on the younger paddocks is always to obtain the highest possible seed yield, excessive grazing on these areas is rigidly avoided.

Newly sown grass paddocks are lightly grazed in May and then spelled until after lambing, when they are again grazed periodically with ewes and lambs until late October. After harvest no straw is left in the paddock for long; it is disposed of by baling or heavy stocking. This ensures quick recovery of the grasses and clovers and reduces damage from grass-grub.

Though the older paddocks on the farm are used for carrying the stock for the greater part of the year, pastures are never grazed hard enough to cause damage to the sward. Stock are rotated regularly from paddock to paddock to allow recovery of the pasture before further grazings are taken.

Harrowing and Topping

All old grass paddocks are double harrowed with tripod harrows in July or August of each year. This operation serves as a means of spreading stock manure and of rejuvenating old pastures and also has a beneficial effect in the suppression of weedy growth.

If seasonal conditions result in excessive pasture growth, paddocks (both seed and grazing areas) are topped as required with the mower. This operation besides curtailing excessive growth prevents reseeding of weed species.

Irrigation

In very dry seasons all crops on the farm suffer from drought. The worst period is between late December and the end of March. The average rainfall for these 3 months is 5.4in. and in drought seasons crop yields are reduced considerably.

To reduce the drought risk and to maintain high yields in such periods the owner has already experimented on a small scale with spray irrigation. Results have been encouraging and he has planned a larger system to be put into operation in the near future.

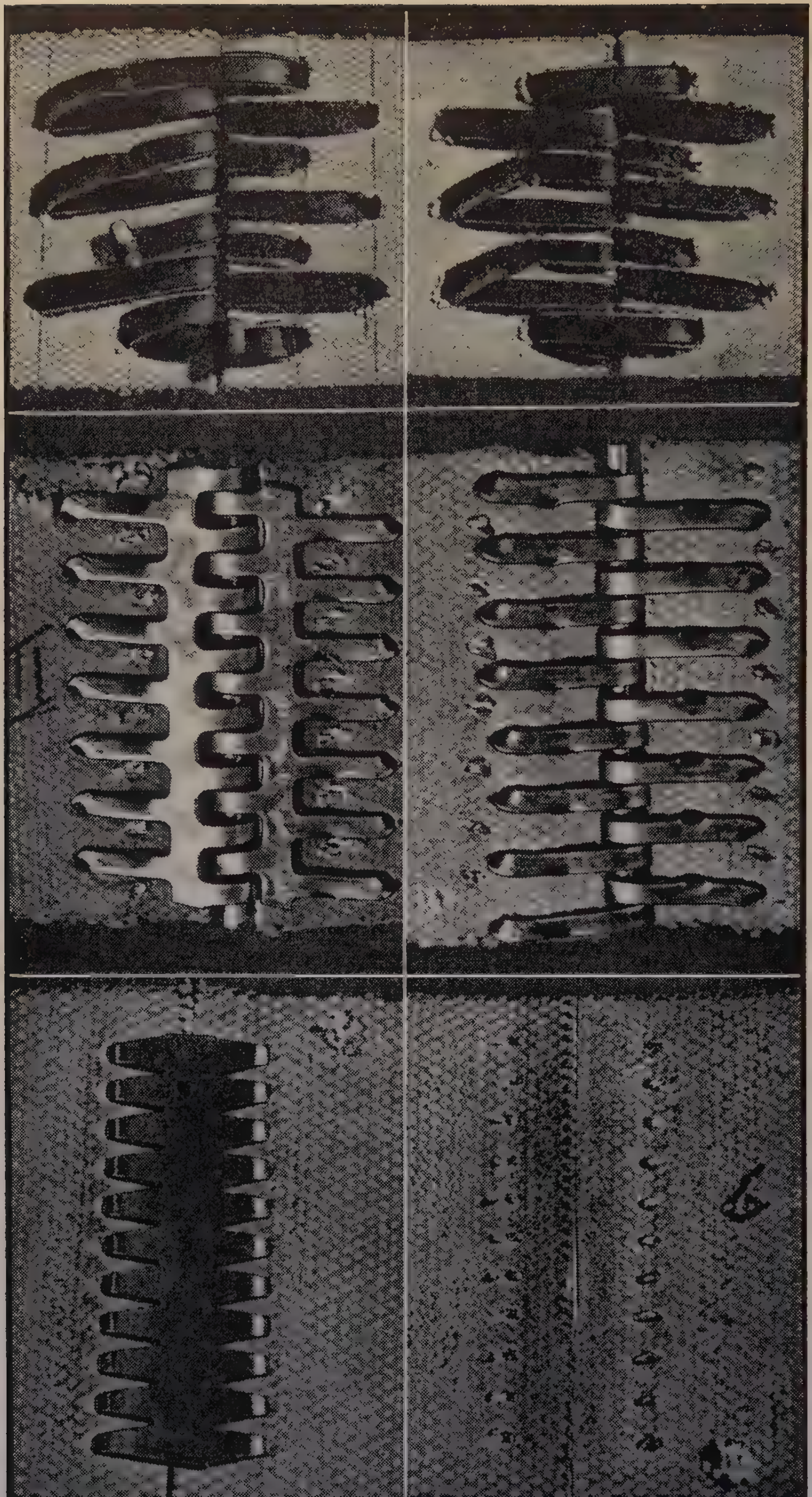
A 3in. high-pressure, centrifugal pump and 150yds. of 3in. irrigation pipe have been bought for irrigating crops and pastures in drought periods. The pump can be fitted to the tractor and shifting of the system from one part of the farm to another is simple.

It is intended to use one of the artesian bores as the source of water for the irrigation system. This is a 4in. bore with a flow of about 12,000 gallons per hour. Water from this bore will be run into the ditches on either side of the property. The drain outlets can be closed to hold a large supply of water for pumping. The tractor with pump attached will move from paddock to paddock and pump water from the drains as required.

This system is expected to be invaluable in droughts, but the owner is also confident that beneficial results will be secured over smaller areas even in normal summers.

The Future

Though prices for small seeds are now far short of those of several years ago, it is obvious from the details of average yields on this property that small seed production can still be very payable in suitable districts. This is emphasised by the fact that the owner intends to increase his area of small seeds in the future. With the added insurance of having irrigation facilities to counter periods of moisture shortage there is every prospect that the good performance of recent years will not only be maintained but probably improved.



Top (left) and reverse (right) views of belt joints. Upper—A joint made with leather lacing, showing the correct method of lacing. The punch holes should be oval. Middle—Heavy clinches of the "alligator" type are fairly safe. The one illustrated has a double grip. The hinge pin should not be longer than the width of the belt. Lower—A belt fastener which is a very safe type. This joint is sufficiently flexible for small pulleys.

The Care

BELTS must be reckoned among the industrial appliances which have caused many serious accidents. The secure fastening of a belt (unless it is in such a position or of such construction as to be as safe to every person employed or working on the premises as it would be if securely fenced) is, as a result of accident experience, a legal requirement. However, apart from the need to guard belts to prevent persons from coming into contact with them, there are other precautions worthy of note which promote both safe and efficient working.

SPLICING AND LACING

Endless Belts

THE joint is the weakest part of a belt and therefore requires the greatest consideration. There are three methods which are universally used: Lacings (principally used on leather belts), metal fasteners of various kinds, and endless, cemented, or solutioned joints. Though excellent results can be obtained from both metal and laced joints, the cemented joint when properly made constitutes what is really an endless belt and eliminates the many disadvantages to which a badly made metal or laced joint is subject. Moreover, it is generally agreed that endless belts offer the surest and smoothest means of power transmission, and it is also claimed that an endless belt will wear longer and cost less to maintain.

Before a belt is cemented or spliced the stretch, which in a new belt amounts to about ¼in. per foot, should be taken out of it. Unless this stretch is removed the belt will slip on the pulleys and needless expense will be incurred in remedying it. After the stretch has been cut off it is the practice to draw the belt tighter than it will be on the pulleys to allow for slack. The ends are then bevelled and cemented together. The lap of the cemented joint should be made so that the pulleys will tend to smooth down the scarf end instead of rolling it up. Vulcanising with stepping splice is recommended for rubber belts. Because of the importance of joining the ends of cemented or spliced belts properly this work should be done only by fully experienced workmen.

Leather Lacing

When belts are laced rawhide or leather lacing is recommended. Ends should be cut short down to the belt and care should be exercised to avoid broken turns.

Belts usually weaken and break near the lacing. To avoid weakening the belt too much holes for lacing should be made with an oval punch with the longer diameter parallel to the sides of the belt. If the width of the belt will permit, the holes should not be nearer than ½in. from the sides nor less than 1in. from the ends of the belt. The second row of holes should be staggered and placed about the same distance from the first row as the first row is from the end of the belt.

When starting to lace a belt see that the ends are square. Start lacing

# of Belts

from the centre, lacing both sides equally tight. Do not cross lacings on the side running next to the face of the pulley. Keep the ends of the belt exactly in line while lacing.

Lacing should not be done while the machinery is in motion and the worker should be protected against the accidental starting of the machinery, preferably by the controlling device being locked. When a line shaft cannot be stopped a belt perch or other device should be used to prevent the belt from coming into contact with the pulley or wrapping on the shaft.

Wire Lacing

Danger from wire laces arises from two principal sources. The clinched ends of the wire may work out, and the wire may break or wear through, leaving ragged points. If wire lacing must be used, it should be in some form of spiral continuous wire stitch so that there will only be two clinching points to turn into the leather on each end of the belt, the two lacings being hinged together. Wire lacings, unless machine made, require a high degree of skill. Care should be taken to see that the wires lie below or flush with the belt surface and do not touch the pulley.

Single wire lacings without hinges should be used only over large pulleys, as they conform more readily to the shape of the pulley. Lacings made of separate wire staples pressed in with or without the use of hinges are particularly undesirable, because the wearing of the belt on the pulleys tends to throw the clinched ends out. Their extreme sharpness constitutes a particular danger, especially when belts have to be handled (for example, belts on cone pulleys and those in a few continuous processes).

Toothed Clinches

Heavy toothed clinches of the so-called "alligator" type are less dangerous than the wire lace or wire staple type, partly because of their weight and strength and partly because the clinched ends run on the pulley side. The best types have a double grip.

Rivets

Rivets offer the possibility of ragged ends on the opened rivet.

Link Fasteners

Certain types of link fasteners avoid the need for clinching, but they are seldom suitable for better class use. They are difficult to align and present open joints that may easily catch in a worker's clothing if fencing is inadequate or if unfenced belts have to be approached.

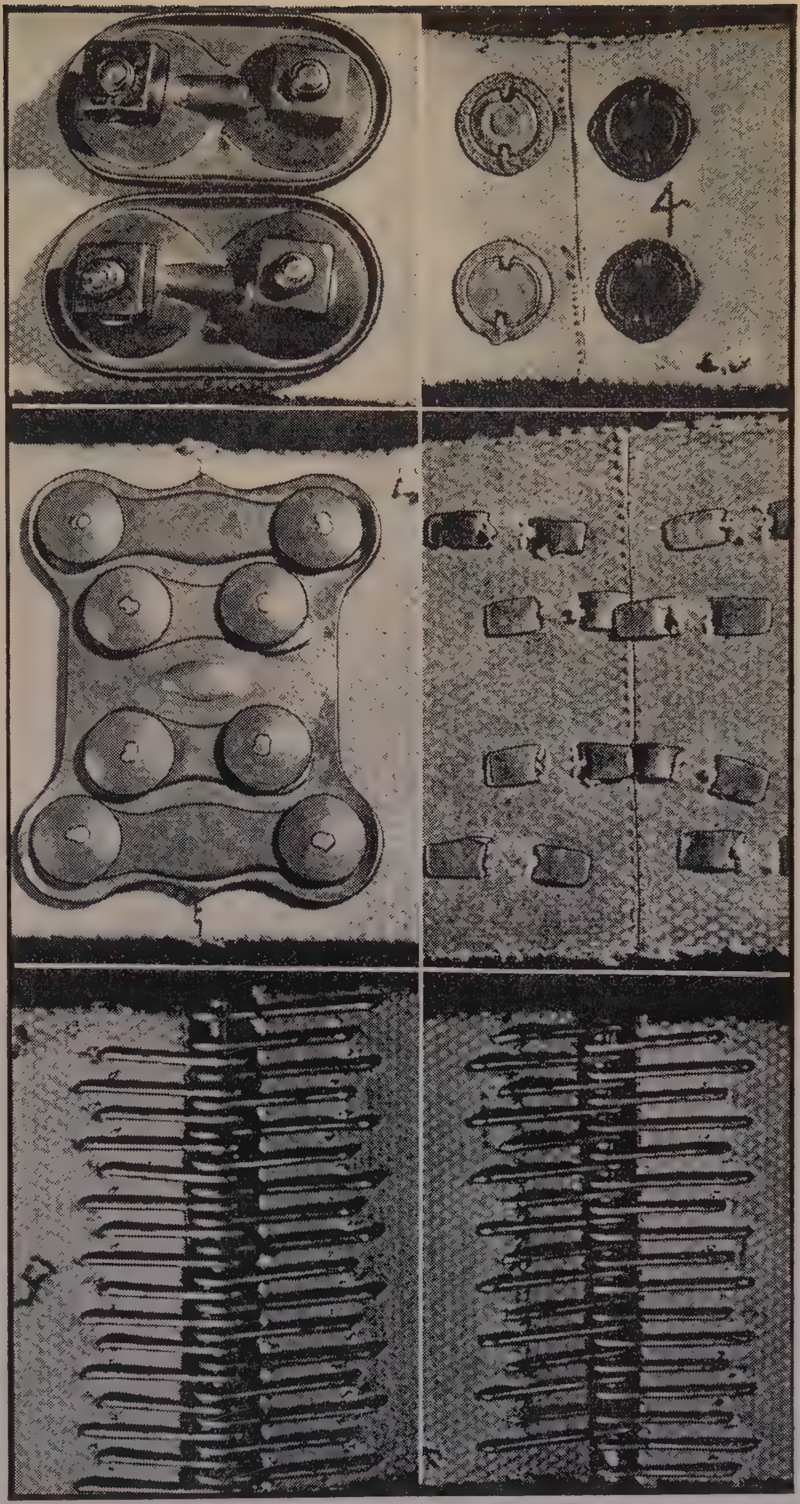
Belt Slips and Breakages

Common causes of belts slipping or breaking are:—

(a) Excessive initial tension in belts.

(b) Slackness of belts.

(c) Careless or ignorant attachment of belt fasteners—for example, using fasteners too small or too light; cutting the butt ends of the belt



Top (left) and reverse (right) views of belt joints. Upper—The protruding nuts and bolts of this fastener make it dangerous. It is also quite unsuitable for small pulleys. Middle—A fastener which is fairly safe but which is not suitable for use on small pulleys. Lower—A wire-laced fastener which is fairly safe. The hinge pin must not be longer than the width of the joint.

otherwise than at right angles, thus producing uneven strain in use; fixing the fasteners in the wrong position; or making the holes for the fasteners unnecessarily big and so weakening the cross section of the belt.

(d) Inaccurate alignment of pulleys.

DRESSING OF BELTS

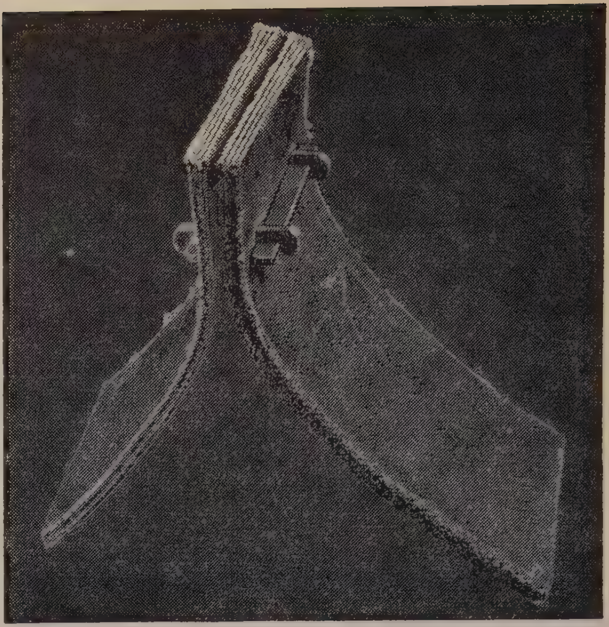
Two serious accidents which occurred while transmission belts were being dressed are referred to in a recent issue of the Industrial Accident Prevention Bulletin published by the Royal Society for the Prevention of Accidents, London. In fact, RoSPA considered that they merited an inquiry into the practice of belt treatment.

The first accident occurred when a fitter was applying dressing to the inner side of a belt 8in. wide. The belt was in motion and the man's hand was caught by a joint in the belt and taken into the nip between the belt and the pulley. The part of the belt to which the man was applying dressing was 8ft. above floor level. The second accident took place when a departmental foreman was applying dressing to a belt 9in. wide. Wooden fencing surrounded the area of the belt and to apply the dressing the man had squeezed through an opening 10in. wide between the motor starter and the end of the fencing.

The Society considered that these accidents gave rise to the following questions. Is it really necessary to apply belt dressing? If so, when and how should it be applied and by whom should the work be carried out? The conclusions reached are set out below.

Belt dressing is often misused. It should be used solely as a lubricant for the fibres of a belt and not with the aim of making a belt pull an extra load. Tanning removes the natural oils and fats from the leather and resilience is restored by dressing during the course of manufacture. It is essential that dressing should be continued while the belt is in service, for correct lubrication will allow the individual fibres to bend and flex more easily and will therefore lengthen the life and serviceability of the belt.

If the true purpose of dressing is borne in mind it follows that dressing should be applied, without exception, to the outer side of the belt. Applied in this way the lubricant can be absorbed by the leather with no danger of interference with proper contact on the pulley. Lack of complete, uniform contact with the pulley constitutes a serious danger to safe running and it is important, in this respect, that a good quality non-adhesive dressing should be used.


This type of fastener, which pins the ends of the belt together, creating a flap of several inches, is dangerous.

Dressing should be carried out systematically and as frequently as the condition and quality of the belt require. It is preferable that dressing should be applied either when the machine is not in motion or when it is controlled by an inching device. The dressing should be applied by means of a stick passed through an opening in the fencing guarding the belt.

The responsibility for dressing all the belt should rest with one man. In a large factory the task could well be included in the duties of a beltman responsible for the general maintenance and repair of belts. In small factories the work should be entrusted to the man whose job it is to oil and grease machines. It is not wise to leave fitters to dress the belts belonging to their own machines.

In order that the belt maintenance man may have a complete record of the condition of the belts under his charge it is advisable that he should keep a "belt digest", that is, a register of belts.

Once the proper purpose of belt dressing has been recognised and an efficient safe system of dressing has been instituted and made the responsibility of one man, there is no reason why this essential task should feature as a cause of accidents.

Acknowledgment

This article has been adapted from an article which appeared in the "Labour and Employment Gazette", Vol. 3, No. 2.

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Radio Broadcasts

RADIO broadcasts to farmers are made at the following times:—

1YA Auckland, 7.15 p.m.

9 June—"Winter Work in the Home Orchard", by F. L. Bailey, Horticultural Instructor, Department of Agriculture, Auckland.

16 June—"Nitrogen in Pastures", by G. B. Haddow, Instructor in Agriculture, Department of Agriculture, Auckland.

23 June—"Country Girls' Clubs", by E. D. P. Eilers, Field Officer in Rural Sociology, Department of Agriculture, Auckland.

1XH Hamilton, 8 p.m.

3 June—"Milk Fever and Allied Conditions", by V. E. Senior, Veterinarian, Department of Agriculture, Hamilton.

10 June—"Peat Land Problems", by J. R. Murray, Instructor in Agriculture, Department of Agriculture, Hamilton.

17 June—"Hill Country Farming", by A. W. Moore, Federated Farmers, Hamilton.

24 June—"Cypress Canker Disease", by C. E. K. Fuller, Horticultural Instructor, Department of Agriculture, Auckland.

2XA Wanganui, 8 p.m.

17 June—"Management of Breeding Birds", by B. J. Russell, Poultry Instructor, Department of Agriculture, Wanganui.

24 June—"Grass-grub Control", by A. A. Duncan, Instructor in Agriculture, Department of Agriculture, Wanganui.

1YZ Rotorua, 7.15 p.m.

10 June—"Sterilisation of Milking Shed Equipment", by L. E. Downs, Special Inspector, Department of Agriculture, Hamilton.

24 June—"Preparations for Lambing", by G. Stevens, Livestock Instructor, Department of Agriculture, Rotorua.

2YZ Napier, 7.10 p.m.

8 June—"Seed Certification", by L. T. Donovan, Seed Dressing Officer, Department of Agriculture, Napier.

4YA Dunedin, 9.15 p.m.

2 June—"Invermay Research Station", by A. A. Cubitt, Farm Manager, and G. A. Holmes, Superintendent, Department of Agriculture's Research Station, Invermay.

9 June—"Fertiliser Trials at Invermay", by N. A. Cullen, Research Officer, and G. A. Holmes, Superintendent, Department of Agriculture's Research Station, Invermay.

16 June—"The Case for Early Shearing", by K. H. C. Lewis and livestock officer, Department of Agriculture, Dunedin.

23 June—"Sheep Husbandry", by R. G. Buchan, Livestock Instructor, Department of Agriculture, Gore.

30 June—"Pre-lambing Treatment of Ewes", by E. A. Pratt, Veterinarian, Department of Agriculture, Oamaru.

Regular Sessions

1XH Hamilton, Mondays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8.5 p.m., Wednesdays at 8.1 p.m. (Northland stock market report), Fridays at 8.1 p.m.

1YA Auckland, Mondays at 7 p.m. (Auckland stock market report), Tuesdays at 12.35 p.m., Wednesdays at 7 p.m., Thursdays at 12.33 p.m.

1YD Auckland, Thursdays at 7.30 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month), Thursdays at 12.33 p.m. and 7.15 p.m. (fortnightly).

2XA Wanganui, Wednesdays at 8 p.m., Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m.

2YZ Napier, Tuesdays at 12.12 p.m. (Hawkes Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m., Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m.

3XC Timaru, Mondays at 8 p.m., Tuesdays (fortnightly) at 8 p.m., Wednesdays at 8.5 p.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m., Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Thursdays at 12.33 p.m.

4YA Dunedin, Wednesdays at 7.20 p.m. and 9.15 p.m., Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

Care of Livestock during June

Contributed by the Animal Research Division

PIG PRODUCTION

SOWS and store pigs should be fed on roots, grass, and up to 1lb. of meat meal or other high protein feed daily. Grazing pigs should not be confined to small paddocks during winter. The use of large grazing areas will reduce pasture damage considerably. Warm accommodation is essential for winter store pigs in order to avoid losses and maintain steady growth. Early-farrowing sows should be put in their farrowing quarters and fed 3 to 4lb. of meal daily. After farrowing they should be fed 4 gallons of milk plus 2/3 gallon for each piglet suckled. Where insufficient milk is available meal should be used to replace the milk in the ratio of 1lb. of meal to 1 gallon of milk. Constipation, which is common in late pregnancy, can be avoided by feeding ½lb. of bran daily or 4oz. of molasses 2 or 3 times during the last 10 days before farrowing.

LIVER FLUKE IN SHEEP

In areas where sheep become infested with liver fluke flocks should be drenched now. The only effective drug is carbon tetrachloride, which should be mixed with 4 times its volume of liquid paraffin. The dose of the mixture is 5 c.c. for sheep of all ages, and 1 gallon is enough for about 900 sheep. Further information about liver fluke in sheep and cattle will be found in Bulletin No. 248, which is available from the nearest office of the Department of Agriculture.

WORMS IN LAMBS AND CALVES

Worms are sometimes still troublesome in May and June, and if lambs or calves are not doing well, they should be drenched with phenothiazine at the full dosage rates recommended by the manufacturers. Further information about worms and drenching will be found in Bulletins No. 171 and No. 189, which are obtainable from the nearest office of the Department.

LICE ON POULTRY

Poultry lice can cause considerable loss of condition in birds and reduced egg laying. To control these parasites a fine trickle of 40 per cent. nicotine sulphate should be run along the perches on a calm night before the birds go to roost. Two or three treatments should be given at weekly intervals.

WINTER FEEDING OF DAIRY COWS

Experiments have shown that cows fed well during winter will produce from 26 to 63lb. more butterfat in the following lactation than those which have been poorly fed during winter. These results were obtained when both groups were well fed after calving. It is therefore very important to feed the cows well from now until calving so that they have ample body reserves to draw on during the first 2 months of the lactation. It is difficult to build up these body reserves with even liberal amounts of hay and/or silage unless some grass is also available throughout the dry period. With a portion of the farm closed up for autumn-saved pasture for feeding after calving it is particularly important to graze the rest of the farm under a controlled rotational grazing system with adequate spelling between grazings, both to ensure continued grass growth during winter and to ration what grass is available throughout this period. Where subdivision is inadequate for this purpose break grazing with the electric fence is essential. Since cows will eat grass in preference to most other feeds, they should be fed as much hay as they will clean up in addition to 20lb. of silage per cow per day.

Grazing pigs should not be confined to small paddocks during winter. The use of large grazing areas will reduce pasture damage considerably.

RICKETS IN LAMBS

Rickets in lambs occurs frequently during winter in Canterbury and other South Island districts. It is also occasionally seen in the North Island. Lambs wintered on green oats or barley are most susceptible, but other green feed or good pasture may produce the condition. It can be prevented by giving one dose of 25 m.g. of calciferol (a vitamin D concentrate) at the beginning of winter. This preparation can be purchased dissolved in olive oil and full instructions for its use are supplied with it. Even where rickets does not occur this treatment may induce better growth in lambs during winter. It is unlikely to be beneficial during autumn and the best time to administer it is about the end of May.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during March and for the 8 months ended 31 March 1954, with comparative figures for the same month and 8-monthly period of 1952-53, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

		Tons		Percentage
Period	Creamery	Whey	Total	inc. or dec.
March 1954	9,656	284	9,940	—
March 1953	14,082	316	14,398	—
Increase or decrease ..	—4,426	—32	—4,458	—30.962
8 months ended 31/3/54	131,586	2,660	134,246	—
8 months ended 31/3/53	147,056	2,734	149,790	—
Increase or decrease ..	—15,470	—74	—15,544	—10.377

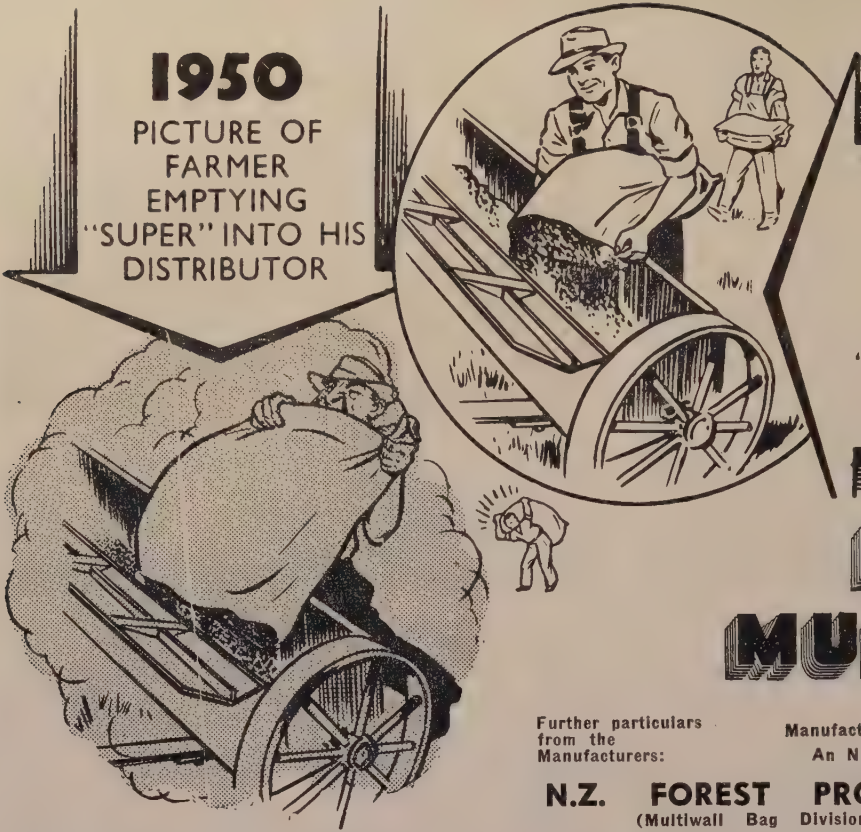
Butter in store at 31 March 1954 was 17,389 tons

CHEESE

		Tons		Percentage
Period	White	Coloured	Total	inc. or dec.
March 1954	9,584	25	9,609	—
March 1953	10,838	25	10,863	—
Increase or decrease ..	—1,254	—	—1,254	—11.543
8 months ended 31/3/54	85,565	159	85,724	—
8 months ended 31/3/53	88,099	134	88,233	—
Increase or decrease ..	—2,534	+25	—2,509	—2.843

Cheese in store at 31 March 1954 was 16,944 tons

If these figures are converted into butterfat equivalent, there is a decrease of 8.797 per cent. in butterfat graded for the 8 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.



1950
PICTURE OF
FARMER
EMPTYING
"SUPER" INTO HIS
DISTRIBUTOR

1954
PICTURE OF
FARMER
EMPTYING
"SUPER" INTO HIS
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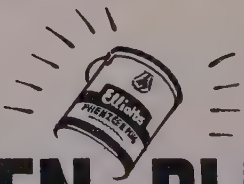
Elliotts



Stick to the phenothiazine drench you *know*—stick to **PHENZEEN PLUS**

Manufactured and Marketed by Elliotts N.Z. Company, Ellco Ltd., Auckland N.Z.

Pasture Management and Topdressing

Seasonal Notes by the Extension Division

PLANS for next season's pasture management and supplementary feeding of livestock should be made now so that an orderly seasonal programme of work is arranged.

GRAZING MANAGEMENT ON DAIRY FARMS

ON dairy farms at least half the farm should be closed for autumn-saved pasture while the herd is wintered on the other half. Cows should be wintered on one paddock at a time, and this should be well dunged up before the herd is shifted to another paddock. As soon as the cows leave it the paddock should be harrowed and closed up. By the time spring growth begins those paddocks wintered on first should have a good growth of grass on them, and those fed out toward the end of winter should be harrowed and topdressed and closed for silage. If possible, paddocks closed for winter-saved grass should not be cut for hay or silage but should be used for grazing. As spring growth increases so can more paddocks be closed for cutting, the aim being to conserve all feed not wanted by the herd. Those paddocks cut for early silage will be available for grazing before the dry autumn weather sets in. If possible, cutting a paddock twice in the one season should be avoided. On those farms containing a high proportion of paspalum in autumn surplus growth must be controlled either by topping or, better still, by conserving surplus growth as silage.

PLANS FOR SUPPLEMENTARY FEED

The aim on any dairy farm should be to conserve all surplus pasture growth as hay and silage, the quantity made depending on seasonal conditions and the class of pasture on the farm. It must be remembered that supplementary feed may be needed for a dry spell in autumn as well as for winter and early spring, the total so needed being about the equivalent of 18cwt. of hay per head in hay and silage. The first paddocks to close are those on which the herd was wintered, and these should be cut for silage. As spring growth comes away further areas may be shut up. It is important that a paddock be cut when it is ready, regardless of weather conditions. It is a mistake to delay cutting too long if the weather is showery, as the grass becomes too mature and the quality drops; under such circumstances silage should always be made. Hay should only be made when weather conditions are really suitable; otherwise the grass should be made into silage. Over the past few years an increasing number of farmers have been ploughing up a paddock each year and putting it into an autumn forage crop which is followed by new grass. The easiest crop to grow for this purpose is soft turnips; chou moellier or greenfeed maize may also be suitable. On suitable soils an area of lucerne is frequently grown and harvested for hay and silage or cut and fed out green in a dry autumn.

ELECTRIC FENCE

There are few farms today on which there is no electric fence available. This is used largely in the feeding off of autumn-saved pasture in spring, as it has been shown that this method of utilising this feed is the only way in which the maximum value can be derived from this valuable fodder. The size of break given varies according to the amount of grass available and the size of the herd. It is usual for the breaks to be fairly small in the early part of the season, when hay and silage are also being fed, and to be increased as the spring growth starts to come away, until finally the cows are on an all-grass diet. When this time comes many farmers are inclined to discontinue the use of the fence and to revert to the old system of rotational grazing from paddock to paddock. There is, however, an increasing number of farmers who are continuing to use the electric fence throughout the milking season, or at least while there is sufficient grass growth to warrant its use. The cows are given a fresh break of grass daily, the size of the break being sufficient to give them a full ration of grass and yet to keep waste to a minimum. The size of break necessary depends so much on the number of stock being milked and the class of pasture available that it is impossible to lay down any definite recommendations, but farmers adopting this method of grazing very soon find out through experience how much grass to give. This system of grazing, by permitting maximum utilisation of the grass, results in a greater area being available for hay or silage and ultimately in increased carrying capacity.

—*A. V. ALLO*

Many farmers plough up a paddock each year and put it into a forage crop which is followed by new grass. The easiest crop to grow for this purpose is soft turnips.

* * *

NITROGENOUS TOPDRESSING FOR SPRING FEED

ON many dairy farms there is often a serious shortage of good grass for milking cows in the early spring, particularly after a very wet winter. The slow growth at this time of year is generally not because the soil is too cold, but because it is lacking in available nitrogen. Large stores of readily available nitrogen are built up in the soil under good pasture in summer and autumn, but this is rapidly removed by winter rains and is not replaced until warmer weather comes again. Applications of artificial nitrogen at the right time and under the right conditions can often bring on good growth some 2 or 3 weeks earlier than where the pastures are left untreated. Nitrogen, particularly the quick-acting forms such as sulphate of ammonia, gives best results when applied to grass that is making some growth. If the soil is too cold, as in mid-winter, for the grass to grow, it is generally a waste of time to apply nitrogen in the expectation of getting earlier and quicker growth. Topdressing with nitrogen should be delayed until late July or early August in most districts and very good results can be got by holding back the nitrogen application in late, cold seasons until well on into late August. Results can be seen in about 2 weeks, and pastures treated at a time when they are ready to respond should be ready for grazing in from 5 to 6 weeks. After treatment 1cwt. or more per acre of one of the quick-acting nitrogenous fertilisers is necessary to give a worthwhile response in early spring, and as the cost of this treatment is high, care should be taken in selecting paddocks with plenty of short-rotation or perennial ryegrass and also areas which have not been eaten bare in the winter but which have a good cover and are making some growth. All the other soil nutrients—phosphate, potash, and lime—should be in good supply, and if sulphate of ammonia is used as a form of nitrogen, it is wise to add at least twice the weight of lime to prevent any chance of increasing soil acidity.

—*A. C. BURGESS*

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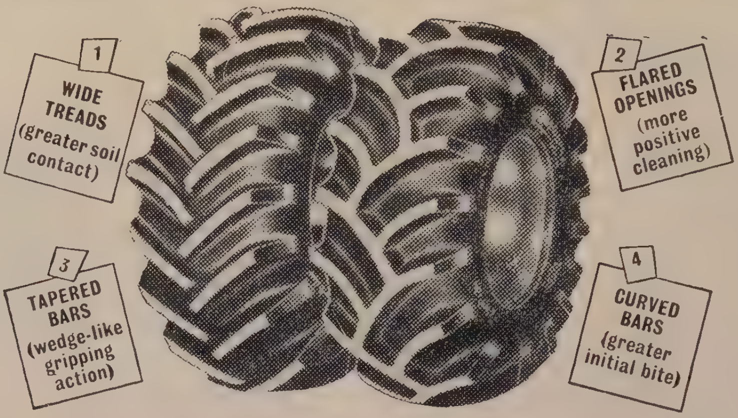
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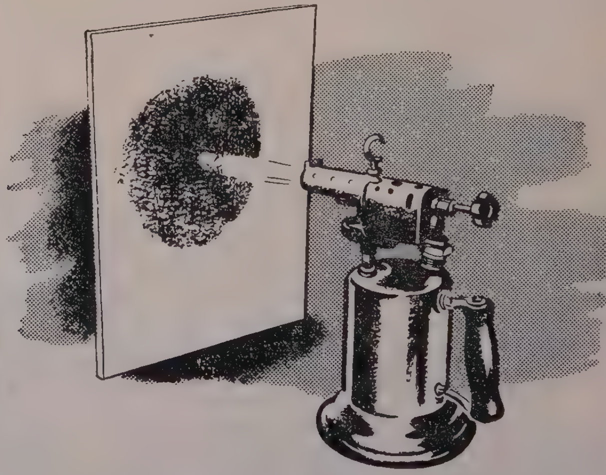

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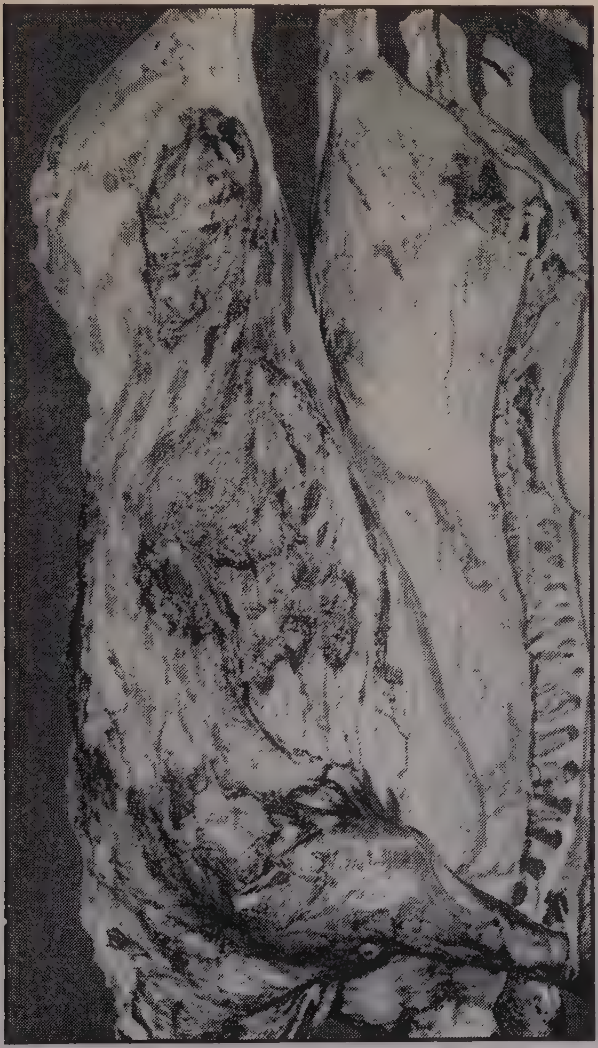
Avoidable Losses in Handling of Meat Animals

By D. H. LE SOUEF, Livestock Superintendent, Department of Agriculture, Dunedin

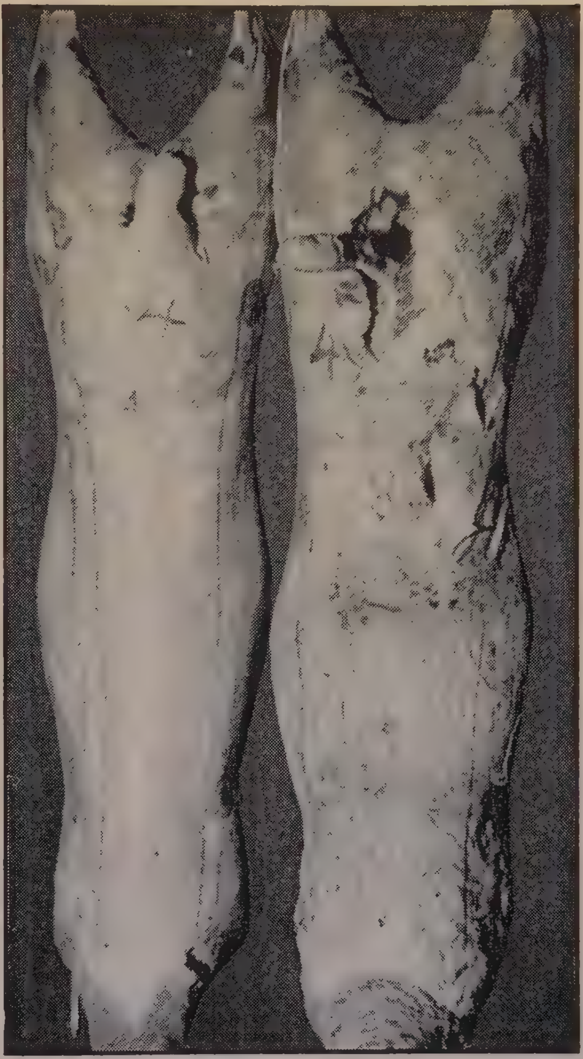
LOSSES of meat as a result of damage during the transportation of live animals from the farm to the slaughter point are considerable, and a few points to remember when handling such stock to be shipped may be of value to stockowners.

TRANSIT tetany, the main cause of loss, occurs for the most part in cattle. Pregnant cattle sent in by rail for slaughter are particularly susceptible, but fat bullocks and sheep may also be affected. Recent reports from Australia show that rams travelling long distances by rail from one property to another suffer from a similar complaint.

The trouble originates when stock in prime condition are taken from lush pasture and driven a distance to railway yards, where they may be held for some hours. The condition is aggravated by the animals being herded into a truck and given a journey without food or water for perhaps 24 hours or more. The digestive system of the animal is upset by droving and dogging, and the consequent starvation during the journey brings about a condition of paralysis similar to that of tetanus, hence the name transit tetany.



A very bad case of bruising in a beef carcass.



Two carcasses showing blemishes caused by injuries received during transport.

The legs of the animal stiffen so that with the motion of the train it eventually is unable to stand, tumbles, and is trampled on by its fellows. Once a beast has fallen the balance of the load in the truck is upset and with lack of the support of each other cattle tend to bruise themselves. During shunting others may fall also and injure themselves or their neighbours. When the train arrives at the works for unloading, affected animals are in a highly fevered state and dangerous to handle, and frequently they are found dead in the truck. This results in a complete loss to the stockowner or freezing company, as no compensation is paid for the carcasses of dead or badly bruised animals. All that such an animal is worth is the hide or its boiling down value.

To overcome or avoid the condition stock raisers are advised to concentrate their fat stock before trucking, preferably in that part of the property handiest to rail, and to hand-feed rations such as silage or hay for a day or two. Lush green feed fed before trucking passes quickly through the digestive tract. This process is accelerated by excitement, so that the bowel rapidly empties, and future nourishment consequently is drawn from the body tissues, with a resultant loss of weight. These are the ideal factors for inducing tetany. The concentration of stock and the change to dry feeding may cause some loss of bloom, but this is of less importance than the loss which occurs when the animal dies or much of the carcass is condemned because of bruising.

Losses from the same causes can occur in the trucking of sheep, but they are not as common as with cattle.

Dog Bites

Causes of damage in sheep include dog bites and wool pulls. A biting dog may cause the second grading of a considerable weight of meat in the season; although perhaps only one leg of a sheep may be damaged, it may mean that the whole carcass is graded down. Anyone owning such a dog would be wise to muzzle it or dispose of it altogether. Worrying by stray dogs is a real menace in the vicinity of towns, and any non-farming readers in rural districts are advised to check up on the habits of their pet dogs if these are left unchained at night.

Wool Pulls

Wool pulls cause damage mainly to fat lambs, especially those of high quality which have been quickly fattened. The pulling shows up mainly along the back and consists of numerous small dark spots or hemorrhages caused by the bursting of tiny blood vessels and subsequent bleeding into the soft tissues under the skin. Such a carcass if badly affected will not be graded for export or at best will be graded down. A little care in handling lambs will be well repaid. Supervision at the trucking yards is wise when strong and enthusiastic workers are hurrying through a job.

Some bruising of one type or another can take place at the freezing works or abattoir, but is rare, as the sheep are not handled to the same extent when being untrucked or moved about in small yards or races.

Pigs, too, may suffer from some of the above abuses in handling and from transit tetany when they have been fed with soft feeds, but an important thing to remember when trucking pigs is their susceptibility to heat or sunstroke. In northern areas, particularly in midsummer, protection from direct sunlight should be provided on trucks and in yards.

Only stock moved by rail have been mentioned. As a very large proportion of all stock now travel by road, excessive handling and delay are avoided by the lorries going direct to the farm property. Only one drafting and yarding is necessary, but though this is a big advantage, due care and caution should be exercised to avoid risk of trouble.

Recommendations

Important points which should be remembered by farmers preparing to truck animals are:—

Stock should be hardened with drier feed before they are shipped.

Undue excitability in handling should be avoided as far as possible.

On rail journeys of over 24 hours, which should be rare in this country, untrucking, watering, and feeding are necessary during travelling.

Accidents with Drilling Machines

THERE is always danger to operators of drilling machines if work is insecurely fixed to the table. If the work is not secured in a proper manner, it will spin round and at "break through" point may run up the drill. A report of an accident caused by wrongly secured work, and one which is typical of many similar types of accidents, is given here.

A VERTICAL drill was used to drill holes more than 3in. in diameter at both ends of heavy side-link forgings 4ft. 8½in. long. Two U-shaped clamps secured by bolts in the table slots were used to secure the job, and with a clamp on each side of the forging the job was firmly held. One side-link had been drilled in this way, but when it was taken out and replaced by another similar link the clamps were both placed on the same side of the forging, no resistance except the clamping pressure thereby being offered to resist rotation under the influence of the drill. When the operator started to drill the forging slipped out from under the clamps, swung round, and trapped the man against the machine pillar, breaking his thigh. Fig. 1 shows the position of the component after the accident.

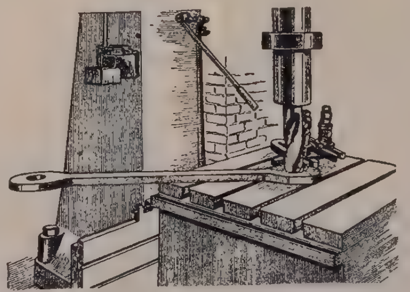


Fig. 1.

More commonly in these cases, especially on smaller machines, the operator tries to hold the work with his hands, which become jammed forcibly against the machine when he can no longer resist the torque.

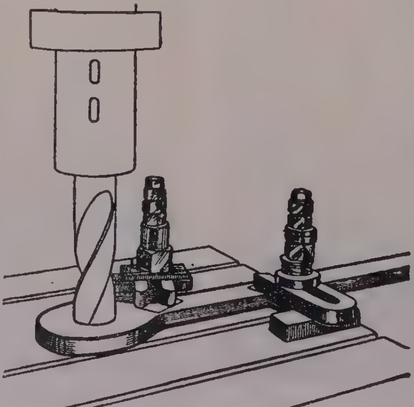


Fig. 2.

When, as in the case reported, a drill is used at one end of the job an effective grip of the work can be secured by placing one clamp on each side of the job as shown in Fig. 2, a practice which ensures that the shank of one bolt is disposed so as to resist the twisting effect of the drill. Alternatively, both clamps may be placed on the same side, provided this is done in such a way that the bolts of both clamps resist the torque.

When work is being done at intermediate positions along the length of the job, so that the drill is between the clamps, the bolts should always be arranged on opposite sides of the work so as to resist the torque applied by the drill.

When flat work is being done two clamps should be used, disposed as far as possible so that their points of application and the hole to be drilled are in the same line (Fig. 3). When a simple strap clamp is used with T-bolts and blocks the block should be as high as, or slightly higher than, the surface of the work on which the other end of the clamp bears (Fig. 4).

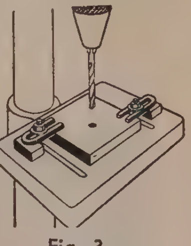


Fig. 3.

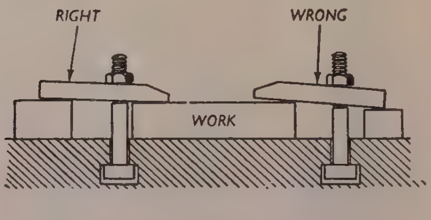


Fig. 4.

C-clamps may be used for shallow depth work which extends near the edge of the table, as in Fig. 5. For round work a system of V-blocks in conjunction with step blocks forms a convenient arrangement (Fig. 6).

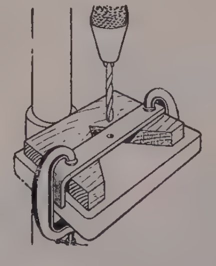


Fig. 5.

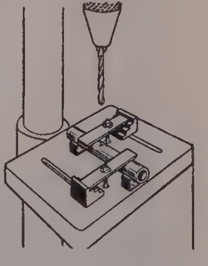
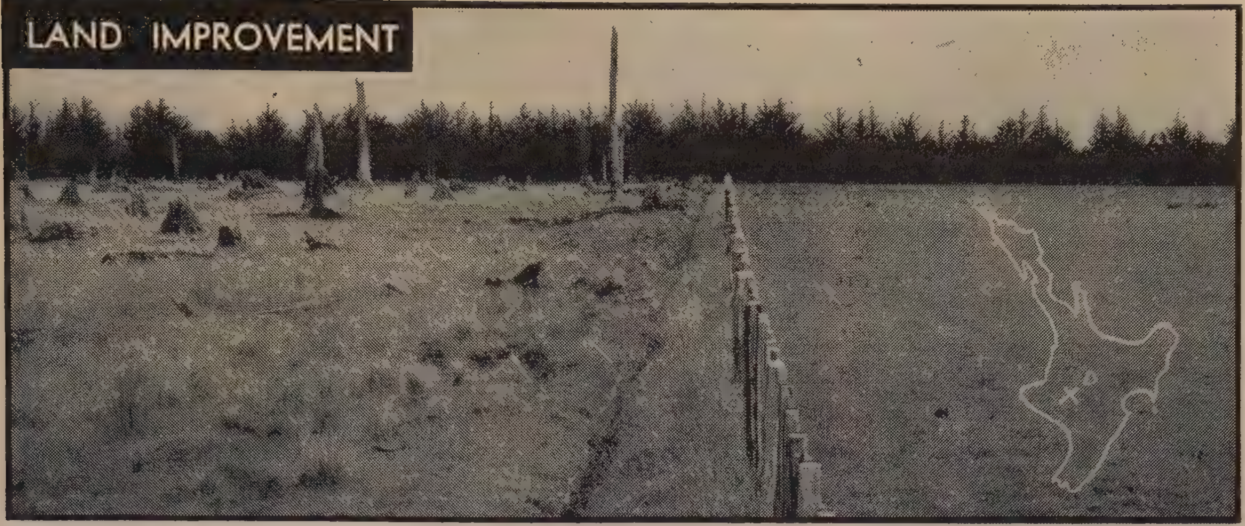


Fig. 6.

The rule should be that whatever the job is it must be clamped. Operators should be instructed in the proper ways to clamp various classes of work.

Acknowledgment

Adapted from the January, 1952 issue of "Accidents—How They Happen and How to Prevent Them", a quarterly publication of the Ministry of Labour and National Service, London.



Drainage of Swamp Land in Waimarino County

THE grit-pan swamp lands of Waimarino County, which are included in the Rahotu soil set, lie wet and unattractive in their undeveloped state—wet because the grit pan forms an impervious layer and stops the water getting away, and unattractive because of the litter of stumps and logs. The country is, however, capable of development and when developed will carry many times the quantity of stock, and in this article A. A. Duncan, Instructor in Agriculture, Department of Agriculture, Wanganui, describes the method of development best suited to this type of country.

THE extent of the increase in production that can be obtained is illustrated from Mr. H. G. Godfrey's 200-acre property, which was taken up in 1930. Butterfat production has been increased from 3400lb. in the first season to 14,300lb. in 1952. In addition in 1952 the property carried a ewe to the acre and sent off 230 fat lambs averaging 38lb. This is not the limit of the increase, because there is still part of the farm to be cleared. The increased production has been obtained by systematically stumping and draining approximately 7 acres each year—a costly operation, but results have more than justified the expense.

In the 1930s and 1940s methods of improvement were arduous and time consuming. Horses and stumping machines, jacks and gelignite were used to clear the timber and the drains were dug with picks and shovels. With the use of suitable machinery the heavy handwork has been to a large extent eliminated.

Present Development Methods

The first step is to use a bulldozer to push the stumps and logs into rows to allow a drainage machine to have a clear run. The clearing work is done in summer, because the wet conditions at other times of the year would not permit the use of the bulldozer. The largest type of bulldozer available is necessary, and even then a small proportion of the stumps have to be blown with gelignite before they can be shifted. The next step is to get in the drainage machine—a back-acting shovel, which has a bucket adapted for digging a narrow drain. On an average the machine digs about 2 chains of drain an hour. The bucket has three fingers, which are particularly useful for dragging out bits of timber and stumps that are in the way. Any stumps that are too big to shift can usually be smashed sufficiently for dislodging by dropping the bucket on them. The combined weight of the bucket and boom is 1½ tons, and this is a particularly effective stump smasher in the hands of an experienced operator.

Draining

In very wet conditions the drainage machine has to work on pads to stop it from sinking. The pads consist of 4 white pine beams 6in. square and 15ft. long, which are bolted together in such a way that there is a gap of 4in. between each beam. These pads are manipulated into position by the machine by a hook at the side of the bucket. The drains are dug down to the grit pan, which is an average depth of 3ft. 6in. below the surface. The reason for digging right down to the grit pan is to make use of it as a solid bottom for the tiles. The drain is finally levelled with pick and shovel to remove minor irregularities. The 4in. tiles are laid on the firm grit pan and turf is tramped around them on either side to stop them from rolling out of alignment. Topsoil and turf are then angle-dozed on top of the tiles with a blade fitted to a wheeled tractor and finally the subsoil is

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HEADING PHOTOGRAPH: Left—Unstumped and unimproved land on the farm discussed in this article. Right—Land which has been stumped, tile-drained, and sown down to improved dairy pasture. The cross on the map indicates the position of the farm.

The drainage machine in operation on swamp land.

pushed into the trench. Loose pieces of timber are pushed into rows by the blade of the wheeled tractor and any small pieces are picked up by hand. The rows of timber are then burnt after any useful matai or maire has been removed.

The drains are dug approximately 15yds. apart and the water from them is collected in an open drain, which is double-fenced and planted with Lawson's cypress on the opposite side of the drain to that where the tiles enter. The dense branches of the Lawson's cypress eventually spread out and stop the light getting into the drain. In consequence there is very little plant growth and this means that the drain and tile outlets can be kept clean with the minimum of attention.

The drainage system is designed so that the open drain is sited along the subdivisional fence and also so that it takes all the water from any particular paddock. There are then no unfenced open drains in the middle of paddocks to interfere with herd management or cultivation.

Cultivating and Cropping

After clearing and draining has been done the paddock is ploughed with a brush-breaker plough and tracklaying tractor, this type of plough having a large skeith which rides over any timber left in the ground. The ploughing is done in August and the ground allowed to weather for 2 months before being given three or four cuts with tandem discs. In November or December the paddock is chain harrowed, which helps to level it, and rolled with a Cambridge roller. The ground is then ready for swedes (Crimson King) and these are drilled at 14oz. to the acre with 4cwt. of serpentine superphosphate. Because of the lack of clover in the original run-out sward, there is very little nitrogen in the ground, and the application of 1cwt. of nitrogenous fertiliser before or after the crop comes through the ground is worth while.

The swedes are fed off in July and August and are followed by December-sown chou moellier for early winter feed. Chou moellier is used as a second crop because club root precludes a successful second crop of swedes. Finally the paddock is spring sown to pasture with a mixture of 15lb. of perennial ryegrass, 8lb. of cocksfoot, 2lb. of timothy, 2lb. of white clover, and 3lb. of broad red clover and topdressed with 3cwt. of superphosphate and 1cwt. of muriate of potash. Both phosphorus and potash are necessary for successful pasture establishment on the grit-pan land; if one or other is omitted, the pasture soon takes on an unthrifty appearance and the clover becomes stunted. With an annual dressing of 3cwt. of superphosphate and 1cwt. of muriate of potash a first-class dairying pasture can be maintained.

The chief aids in the improvement of the grit-pan land are the bulldozer, the drainage machine, and the correct fertiliser technique. With their use the country is being brought in at an increasing rate and the markedly enhanced appearance of the land which is already developed is not without its stimulus.

◆

Checking Efficiency of Milking Machines

SINCE the trials carried out in the Thames and the Te Awamutu districts in 1950 in the checking of the efficiency of milking machines the Dairy Division has every year extended its coverage and service. In this article W. G. Batt, Supervisor of Farm Dairy Instruction, Department of Agriculture, Hamilton, summarises the results obtained in 1953 and reviews the service to date.

THE service of checking the efficiency of milking machines was extended during 1953 to include a further 20 districts, making a total of 32 in which the service is provided. The considerable coverage of the Dominion obtained by this extension included the instructorates at Hikurangi, Maungatapere, Wellsford, and Helensville in North Auckland; Auckland, Pukekohe, Waiuku, Hamilton, Te Awamutu, Morrinsville, Paeroa, Thames, Tauranga, and Te Puke in the South Auckland-Waikato and Bay of Plenty areas; Eltham, Stratford, Hawera, and Wanganui in the Taranaki-Wanganui district; Feilding, Palmerston North, Levin, Wellington, Hastings, and Greytown in the Wellington-Manawatu-Wairarapa-Hawkes Bay area; Rangiora, Ashburton, and Temuka in Canterbury; Oamaru in Otago; and Riverton and Edendale in Southland.

The summary of the checking of machines in the trials of 1951 and in the extended service in 1952 showed the small number of about 20 per cent. of the machines in use as efficient and requiring no attention to improve their performance. The figures for 3 years are:—

	Machines checked	Machines efficient per cent.
1951	100	23.0
1952	546	20.6
1953	983	19.2

Results from the greater number of machines checked in 1953 have fully confirmed the earlier results. Below is a summary of the findings which can be compared with the summaries published in the January 1951 and the May 1953 issues of the "Journal".

Total machines checked	983
	Per cent.
Machines efficient, requiring no recommendation	19.2

The seal and stamp used by Ruakura Animal Research Station to seal tested meters. The testing and sealing of the meters is a guarantee of their accuracy.

Air reserve

Machines with no air reserve	8.0
Machines with air reserve under standard	72.7

(The operation performance of 8 per cent. would be extremely inefficient and that of 80 per cent. could be improved.)

Vacuum pumps

	Per cent.
Under capacity by inefficiency from wear and tear	9.7
Under capacity for type or size of machine	34.5
Under capacity by insufficient speed	17.1

(Insufficient reserves of air which would be likely to cause slow and unsatisfactory milking were caused primarily by insufficient vacuum pump displacement.)

Vacuum gauges

	Per cent.
Inaccurate by under 1in.	18.4
Inaccurate from 1in. to 3in.	38.8

Relief valves

Obsolete type or unsatisfactory in condition	66.2

(A satisfactory reserve of air must be effectively controlled by an efficient vacuum regulator. The combination of sufficient reserve air and effective control is fundamental to good machine performance.)

Air leaks

	Per cent.
Machines showing air leaks	69.7

Pulsators

At incorrect or irregular ratios	24.6
Leaking	12.5
Releaser pulsator incorrectly set	19.1

Releasers

Functioning incorrectly	38.8

(In most cases the faulty operation was due to failure to maintain the working parts in good condition. Bad seating or leaking flaps were the most common fault. They provided air leaks which caused an unbalance of vacuum in the chambers. Farmers should regard the releaser component as deserving more attention, and effective cleaning and the immediate replacement of perished flaps should be a regular practice.)

Machine parts

	Per cent.
Unsatisfactory piping	5.2
Unsatisfactory rubber	31.0
Faulty parts	.04

The results obtained from the season's work and from the greater number of machines checked again demonstrate the value of checking the efficiency of milking machines in use and show clearly that dairy farmers could obtain improved milking if plants were maintained in better working condition.

The appropriate time for the operation of a machine checking service is late autumn and winter, as the farmer is able to carry out any alterations during the off-season.

Before the coming winter the Dairy Division proposes to establish facilities to provide a limited Dominion service. Farm Dairy Instructors in 34 districts will be trained and equipped and will attend to requests received from their own and from neighbouring districts as they can be arranged. Eight senior officers will provide an over-all coverage of the remaining districts. Farmers wishing to the avail themselves of this service should apply to the Farm Dairy Instructor of their district.

◆

Ropes, Knots, and Splices for Farm Use

By M. J. CAMPBELL, Farm Manager, Department of Agriculture's Animal Research Station, Ruakura

DESPITE the increased mechanisation of New Zealand farming rope is still one of the most valuable pieces of equipment on the farm. Though the farmer does not need a detailed knowledge of the art of knotting and splicing of ropes, the fact that rope is still required for a hundred and one day-to-day jobs makes it essential that he knows a little more about the subject than merely how to tie a granny knot.

GOOD rope, too, becomes more expensive every year and it is therefore important to know how to care for it and use it properly to get maximum life and efficiency from it.

Manufacture of Rope

The essentials for the manufacture of good rope are:—

1. The selection of good fibre.
2. Preparation and "spinning" of such fibre into yarns of uniform size and strength.
3. "Forming" such yarns with the proper "packing" and "twist" to produce a solid and circular strand.
4. "Laying" of three or more such strands into rope.

Manila hemp is received in bales of approximately 280lb. The bales on receipt are subject to a strict routine inspection for quality and are "batched" by the mixing of definite proportions of different grades according to the type of rope to be made. Colour, strength, and texture of fibre require most careful attention, as no amount of skill in making can overcome the handicap of inferior material.

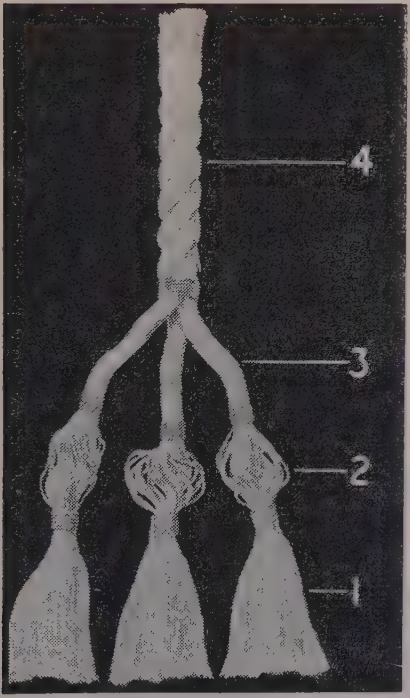

Fig. 1: 1—Sliver. 2—Yarns. 3—Strands. 4—Completed rope.

After batching, the fibre is passed through a machine where it is combed out by a number of moving pins and formed into a continuous ribbon known as a sliver. When the combing process is completed the fibre is spun into yarn and, after inspection, passed on to the rope-making department. A number of yarns, varying according to the size of rope to be made, are "formed" into strands. Three or more strands are then "laid" into rope. Much depends on the skill with which these operations are carried out. The disposition of the yarns in concentric circles to form the strand must be absolutely correct, or the strand will not keep its shape. Very important also is the amount of twist put into the strand and "lay" put into the rope, as not only must these balance, but they must be suitable for the work in view.

British Standard Minimum Breaking Strengths of Manila (Grade 2) and Sisal Ropes

Circumference (nominal) in.	MANILA Breaking strain tons	MANILA Breaking strain cwt.	SISAL Breaking strain tons	SISAL Breaking strain cwt.
½		—		2¼
⅝		—		3½
¾		—		5
⅞		6½		6½
1		9½		9½
1¼		12½		12½
1⅜		15¾		15¾
1½		18¾		18¾
1⅝	1	2	1	2
1¾	1	5¼	1	5¼
2	1	15½	1	15½
2¼	2	2½	2	2½
2½	2	16½	2	16½
2¾	3	7	3	7
3	4		4	
3¼	4	13	4	13
3½	5	6½	5	6½
3¾	6	1½	6	1½
4	6	16½	6	16½
4¼	7	12	7	12
4½	8	10	8	10
4¾	9	7½	9	7½

The art of ropemaking lies in the experience and skill with which all these factors are combined.

Materials for Ropemaking

Modern ropes are made from three main types of fibre: Manila hemp (*Musatextilis*), produced in the Philippine Islands; sisal hemp (*Agave sisalana*), from British East Africa, Java, Mexico, and Brazil, and flax (*Phormium tenax*), grown in New Zealand.

Manila hemp is not used in New Zealand to the same extent as in the past, owing to the raw material having to be obtained from hard currency sources. New Zealand flax is used for the manufacture of rope of small size (2in. circumference and under).

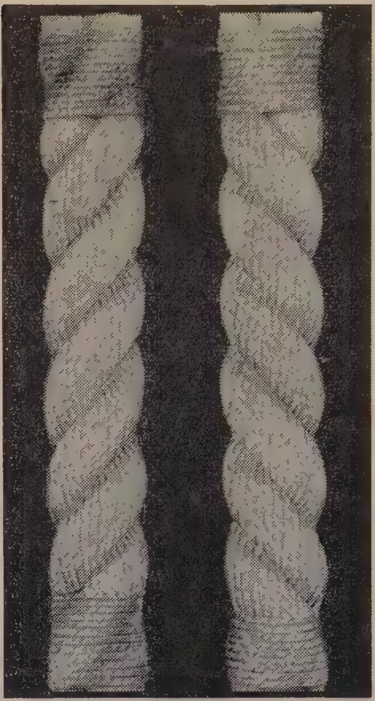

Fig. 2—Right-hand lay (left) and left-hand lay (right).

Tensile Strength of Different Types

Rope in general use throughout the world is made from either sisal hemp or manila hemp, for which there are British Standard Specifications breaking strains.

New Zealand flax varies considerably in quality and strength of fibre; consequently it is not possible to give a definite standard breaking strain for ropes and twines made from this material. As a general guide New Zealand flax fibre has between 75 and 100 per cent. the strength of sisal. The table on this page shows the strengths for normal 3-strand ropes, which are the common type. Four-strand ropes are sometimes used; these have slightly less strength than 3-strand.

Care of Ropes

Storing: Great care should be taken when storing rope, as the fibre is very susceptible to damage from alkaline or acid materials such as caustic soda and superphosphate and other fertilisers. Rope should never be stored on floors or near sacks where fertilisers have been held. It should be hung in a dry, airy room free from all contaminating substances. When damp or wet it should be dried outside, preferably by hanging it on a fence under trees or some place out of direct sunlight.

Proofing: Dry rot, usually caused by improper storage, can cause serious deterioration. It can be controlled by

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proofing rope with copper salts of the "Metalex" type. Baler twine manufactured from New Zealand flax and sisal is treated in this way with the object of preserving its strength for at least one full season, preferably two.

Care in use of rope: The strain on rope must be reduced during wet weather, as otherwise damage will be done either to the rope or to articles to which it is attached, such as tarpaulins or tents. Where rope is required to run over pulleys, as with haylifts and blocks, size of rope and pulleys should be calculated to eliminate as much as possible sharp bends and acute angles. Excessive wear will occur when force is applied if this requirement is overlooked.

Mechanical damage to rope can be caused by allowing the surfaces to rub when moving in opposite directions or when running over sharp edges and rough places. For this reason rope should never be dragged over rough metal. Whenever rope contacts soil or mud it should be hosed or washed thoroughly to remove all foreign matter before it is dried and stored. All kinks should be carefully removed before strain is applied, as they cause fibre damage in the same way that kinks in fencing wire render it liable to break on straining.

Rope Terms

Standard lay implies a rope with the angle of lay which experience has shown combines pliability, strength, and ability to withstand chafing to the best advantage for all general work.

Soft lay or long lay implies a rope in which the angle of lay is less than normal. This increases the pliability and to some extent the breaking strain. It is necessary for some purposes, but soft laid rope is more liable to absorb water and lose its shape.

Hard, firm, or short lay implies a rope in which the angle of lay is greater than normal. The effect is to increase the ability of the rope to maintain its shape under pressure and to reduce the absorption of moisture. Both breaking strain and the pliability are, however, reduced.

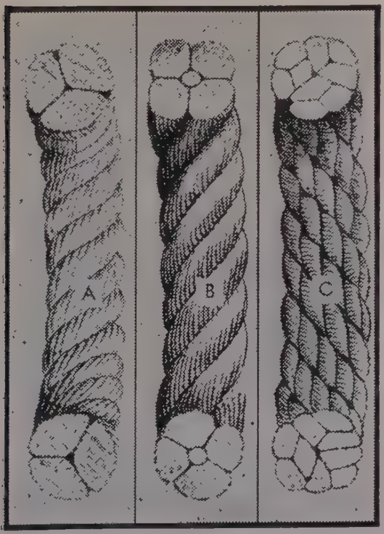

Fig. 3: A—Three-strand rope. B—Four-strand rope. C—Nine-strand rope.

Right-hand lay means the final laying together of the rope, irrespective of its construction, from right to left.

Left-hand lay means the final laying together of the rope, irrespective of its construction, from left to right.

Fig. 2 shows the difference clearly.

Three-strand rope (plain lay): This is the general standard and most common type of rope for all ordinary purposes (A, Fig. 3).

Four-strand rope: The characteristic feature of this type, compared with 3-strand, is its bigger bearing surface. Its weight is greater and its strength less (B, Fig. 3).

Nine-strand rope (cable or water lay): This is made by laying together 3 ropes of 3 strands each (C, Fig. 3).

Knots, Hitches, and Splices

Though ropes are constantly in use on farms, it is surprising how much good rope is ruined annually through failure to tie knots which can be readily undone when the strain is released. Knots and hitches incorrectly tied will either slip or become so tight under strain that they will probably have to be cut to release them, especially when used in wet conditions.

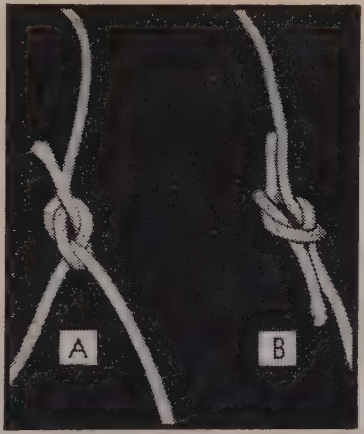

Fig. 4: A—Granny knot, which should not be used. B—Reef knot.

The following knots, hitches, and splices have a wide general application; with a little study they can be easily mastered, and the daily routine will afford ample opportunity for their practical use.

Reef Knot

One of the simplest and easiest methods of joining two rope ends is by a reef knot (B, Fig. 4). It should be noted that the end which comes over from the top in the first loop should remain at the top when the second loop is being made. If this end is looped under the upper end the result is a granny knot (A, Fig. 4). A reef knot is sufficiently secure for ordinary purposes and can be readily undone by pushing the two short ends together. A granny knot is liable to slip and is often difficult to untie. When a soft twine is used a reef knot can be made additionally secure by inserting one of the short ends twice through the second loop.

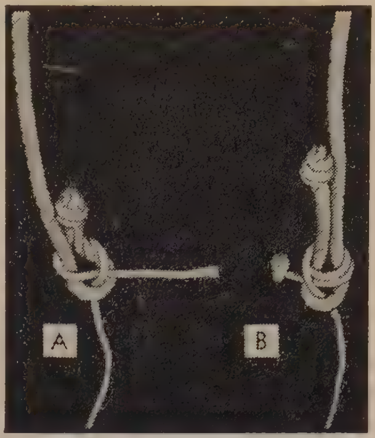

Fig. 5: A—Sheet bend. B—Double sheet bend.

Sheet Bend

The sheet bend knot (A, Fig. 5) is adapted for joining two ropes of unequal size, but is safe only if the joined rope is kept tight. It can be made more secure by inserting an additional loop with the smaller rope (B, Fig. 5). When used for small cordage where the ends to be joined are of equal size the sheet bend makes a reliable and permanent knot.

Fisherman's Bend

The fisherman's bend is one of the safest of all knots, and if properly made it cannot slip. There are right and wrong ways of tying this knot (Figs. 6 and 7). The fisherman's bend can also be used for joining ropes of different sizes by making a hitch of each short end round the rope and pulling it tight. This, however, makes the knot much harder to untie, as the two hitches cannot be slipped apart by simply pulling on the short ends.

Carrick Bend

The carrick bend is the usual method adopted for connecting two large ropes and has the advantage that it is very easy to tie and can be applied at any part of either rope. It will also withstand strains on any or all of the four leads without slipping. It is sometimes used during the setting up of a derrick mast for uniting bights in the middle of two ropes. The central loop is then passed over the mast and the four ends used as guy ropes (Figs. 8 and 9).

Bowline

Where it is desired to make a running noose or a loop which will not slip or pull up tight the bowline will be found useful. This knot is simply made, is easy to untie, and has a very wide range of application. It is one of the best knots for tying a horse, as it cannot possibly tighten and choke an animal. It is also a good knot for tying the reins to the bit rings or for making a secure and non-slip hitch. The knot is begun by looping the rope as in A, Fig. 10. The loop must be made with the short end on top and the short end is led in from below, passed under the long end beyond the loop, and then led up round this and passed down through the loop (B, Fig. 10).

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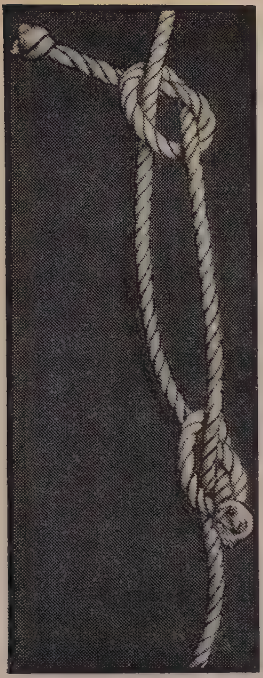


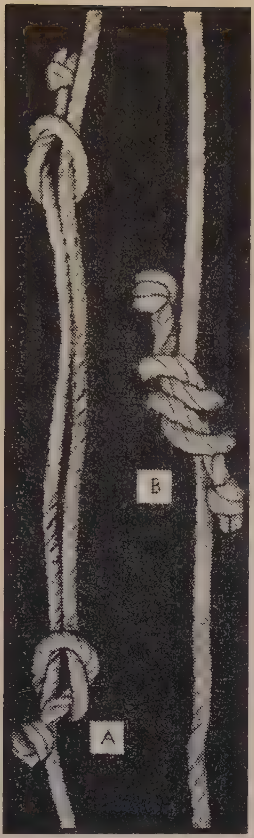


Fig. 6 (above)—Fisherman's bend, wrong method. Fig. 7 (right)—Fisherman's bend in making (A) and pulled up (B).

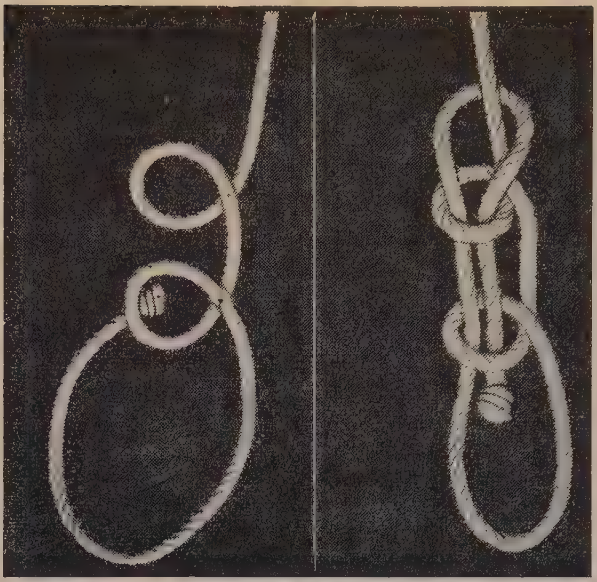


Fig. 11 (left)—Water bowline, showing method of tying. Fig. 12 (right)—Completed knot.

Water Bowline

The water bowline is perfectly secure and will not slip under any conditions. It consists merely of a loop with a bowline below, and is made with two loops (Fig. 11), one above and one below, the short end being threaded through as in a bowline. The great advantage of this knot lies in the ease with which it can be undone when wet. This makes it particularly suitable for use under water.

Bowline on a Bight

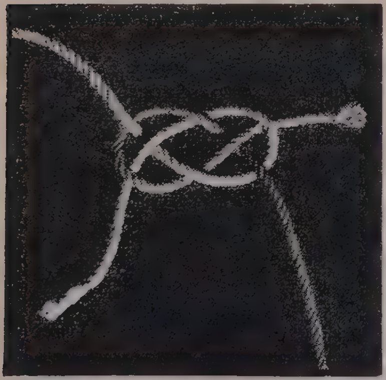
The bowline on a bight (bosun's chair) is a knot sometimes used as a working cradle by painters and is also used as a foundation knot in arranging a rope harness for throwing horses. It can be made quite simply by first making an overhand knot as in A, Fig. 13 and then looping the single loop back over the double loop on to the main ropes as in B, Fig. 13.

If the double rope loop (C) is then spread out to form two single rope loops, it can be used as a bosun's chair (Fig. 14). The bosun's chair can be easily made by doubling the rope and making an ordinary bowline knot. Used for throwing horses, the double loop is passed over the horse's head to rest on its shoulders, and the two single ends are led off between the front legs, round the hind feet, and back through at the shoulder. When the ends are pulled the animal is brought gently to the ground, and the hind legs are then held by hitching them with the ropes.

Hay Knot

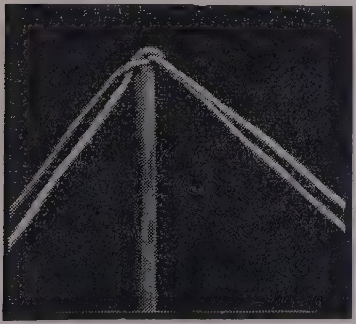
The hay knot will be found extremely useful for lashing a load on a wagon, and for those engaged in carrying work it is indispensable, as it can be used for roping round a load or over it with equal facility. Its use gives a mechanical advantage of nearly two to one, and the strain can be easily held while the finishing hitch is made secure.

To make the knot, reach up with the left hand and make a single loop at a suitable height (A, Fig. 15). Then with the right hand double the slack of the rope into a loop and pass this through loop A as shown in Fig. 15. Still holding an easy strain, lead the free end of the rope round a ring bolt in the wagon or truck and back through loop B (Fig. 16), which acts as a pulley and provides a purchase for tightening up the load (Fig. 16). The knot is secured by a hitch as in Fig. 17. Though in normal use this knot will never slip, it can be made proof against accident by a half hitch



[*Sparrow*

Fig. 8 (above)—Carrick bend. Fig. 9 (below)—Carrick bend used with guy ropes.



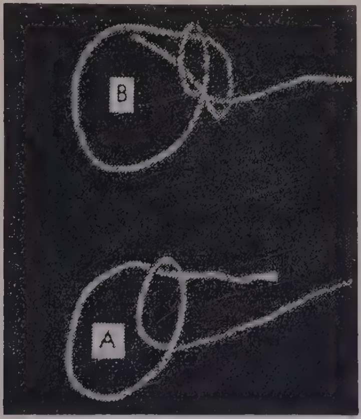


Fig. 10—Bowline. A—Method of tying. B—Completed knot.

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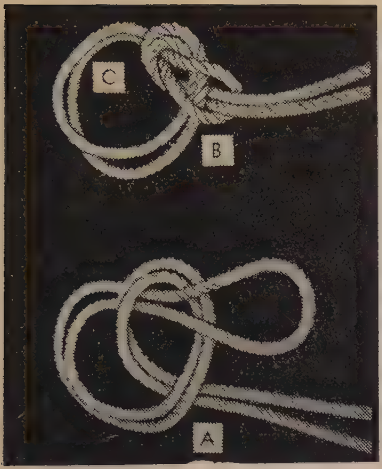


Fig. 13—Bowline on a bight. A—Method of tying. B—Completed knot. C—Double loop (see text).

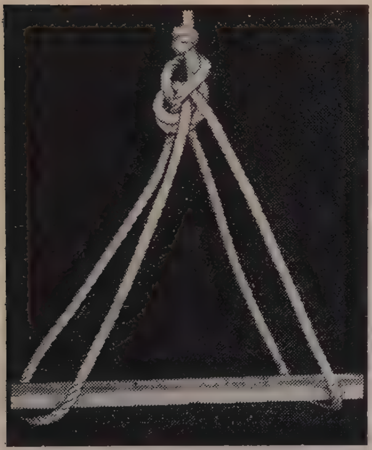


Fig. 14—Bosun's chair ready for use.

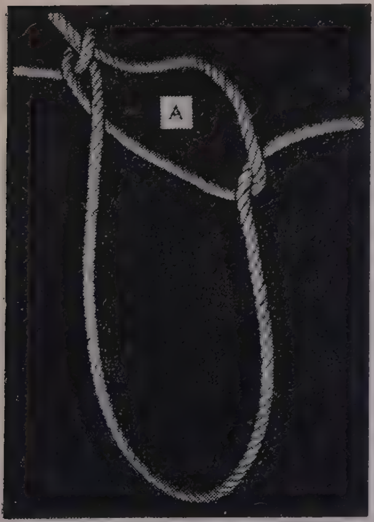


Fig. 15—Hay knot.

of the upper loop round the rope as in Fig. 17. This eliminates any risk of the upper loop being inadvertently pushed through the hitch.

Sheepshank

The sheepshank is a variation of the hay knot and is well suited for shortening rope without cutting it. It is started in the same way as the hay knot and is completed with a half hitch round the bottom of the loop similar to the first half hitch at the top (Fig. 18). The sheepshank will not slip under strain unless either of the ends of the loop is pushed through the half hitch. It can be made secure and permanent by hitching the loop ends round the rope.

Chain Hitches

A rope may be hitched to a chain simply and expeditiously as in A, Fig. 19. B, Fig. 19 is a useful hitch for joining a rope to a closed link. This hitch will not slip in use, but it may work loose if the chain is left slack. It is intended chiefly for temporary work. The hitch shown in C, Fig. 19 is slip-proof and is well suited for a permanent join.

Clove and Timber Hitches

Hitches may be used conveniently for lifting timber or for holding a strain. The clove hitch (A, Fig. 20) is simple and easily applied, but it is liable to slip, particularly if the rope is wet. The timber hitch (B, Fig. 20) is safer in use, though more difficult to apply. The timber hitch is very similar to the clove hitch, but the short end of the rope is led a distance along the load and is then turned round to form a looped hitch. The loop is held secure by tucking the end for a few turns to wedge it between the hitch and the load. In the timber hitch the direction of the pull on the upper hitch is directed so as to tighten the grip of the bottom looped hitch. C, Fig. 20 shows the upper hitch taken in the wrong direction; it should be reversed as shown in B, Fig. 20.

Rolling Hitch

The rolling hitch (Fig. 22) is regarded as the safest of hitches and

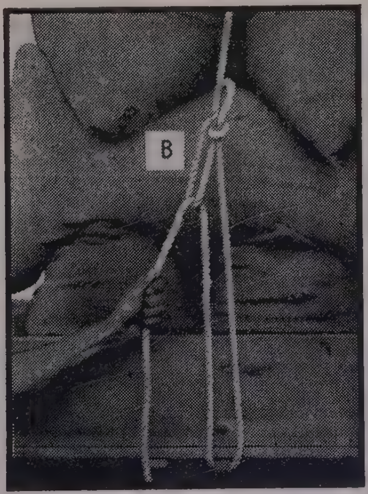


Fig. 16—Hay knot in use.

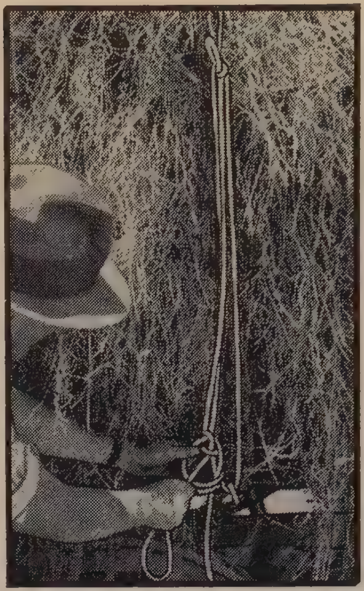
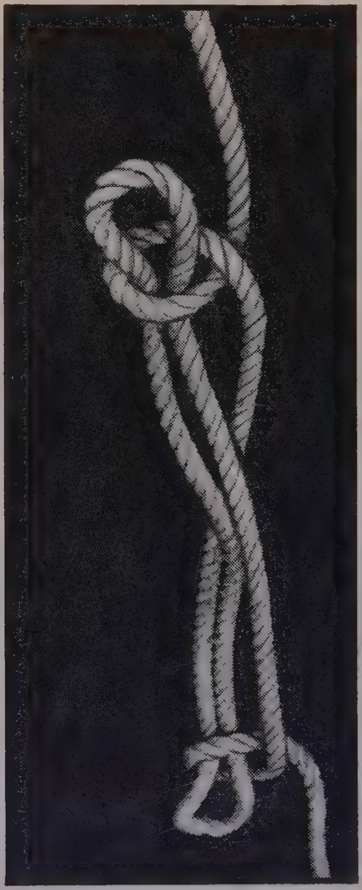


Fig. 17 (above)—Hitch used in securing hay knot. Fig. 18 (below)—Sheepshank.



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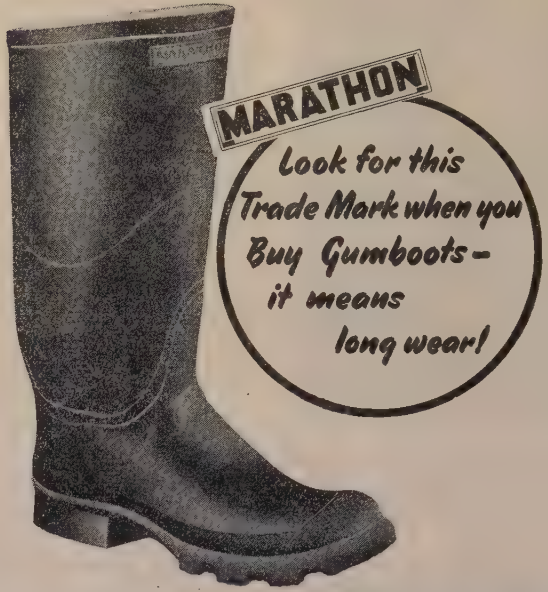
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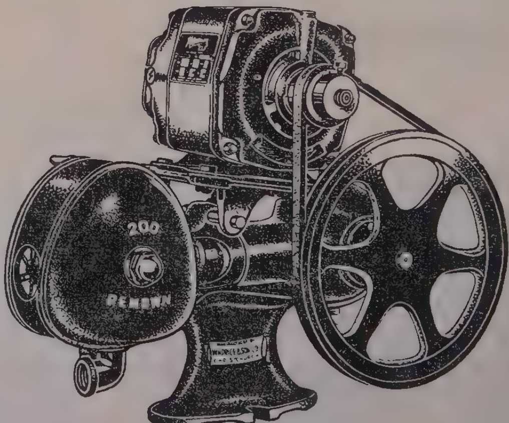

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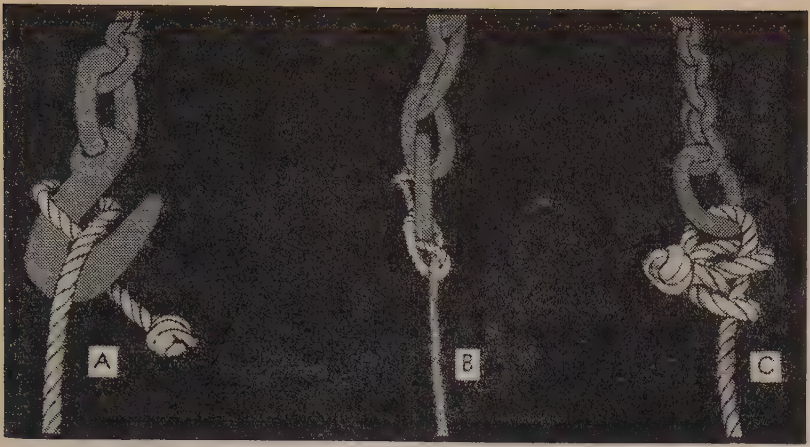

Fig. 19—Three types of chain hitches.

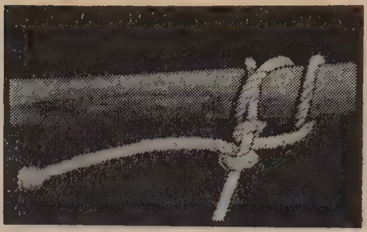

Fig. 22—Rolling hitch.

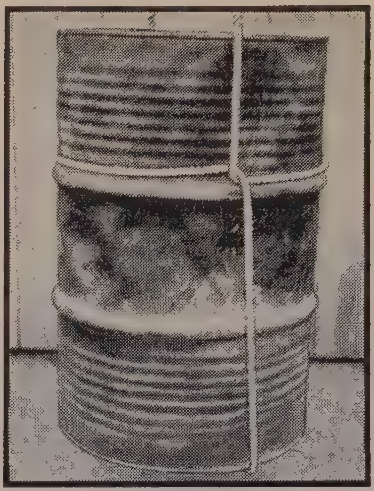

Fig. 23—Bottleneck hitch.

is commonly used for handling round timber. It is also useful for hitching an animal to a post or to a picket line, as in addition to being secure, it will not slip in any direction. It can be easily undone when the strain is removed.

Bottleneck Hitch

The bottleneck hitch is at times useful when it is required to raise a barrel or tank in a vertical position as for lifting water or for earthing a silage stack (Fig. 23).

Splicing Ropes

Because of the extent to which ropes are used on the farm, a knowledge of splicing is an asset. Not only is the splice neater than any knot, but it is more convenient to handle and if properly made, it will enable a broken rope to be used for pulley work. Two types of splice are commonly used for joining rope lengths—the short splice and the long splice. The former is suitable for all general purposes, but where the rope is intended to pass easily over a pulley the long splice is preferable. For practice work a slightly worn rope is better than a very new or very old rope. A marlin spike is useful for opening up the rope.

Short Splice

In the short splice the work is begun by laying the strands back a short distance according to the size of the rope. For ordinary 1¼in. ploughline 7in. on each of the ends to be spliced will be ample. The ropes are now intermeshed, with each strand of No. 1 rope between two strands of No. 2 rope (A, Fig. 24). One set of ends should now be lashed to the opposite rope to hold them in position while the other set is being spliced. The strands of No. 1 rope are now interwoven along the unwound part of the No. 2 rope by crossing each over its immediate neighbour and under the next. The rope may be twisted to open the strands, but it should be turned

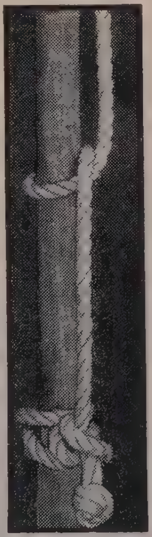

Fig. 21—Well pipe hitch.

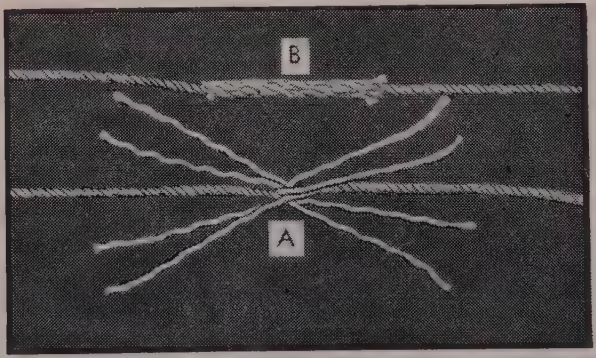

Fig. 24—Short splice. A—Start. B—Finish.

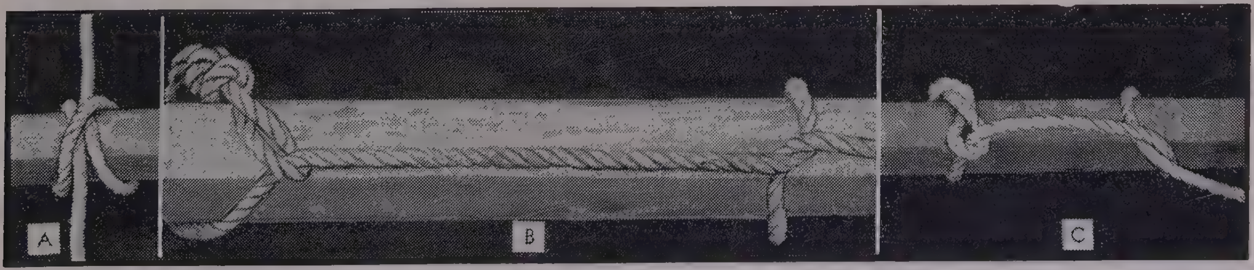

Fig. 20: A—Clove hitch. B and C—Timber hitch. In C the upper hitch is taken in the wrong direction; it should be reversed as in B.

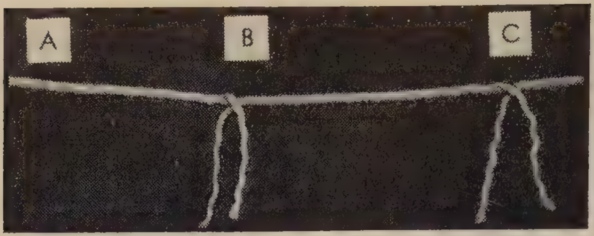

Fig. 25 (above)—Long splice, showing one pair of strands completely worked in at A and two pairs cut off ready to be worked in at B and C.

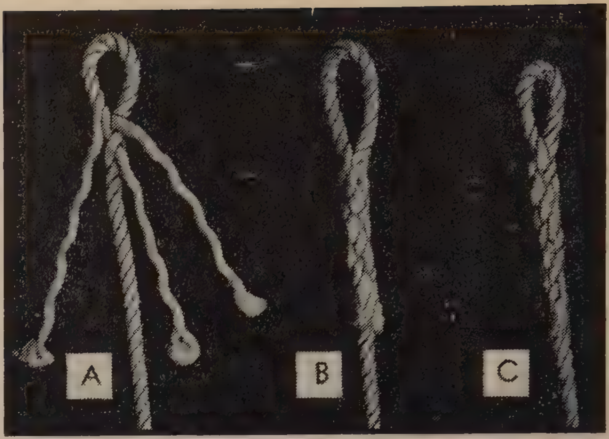

Fig. 26—Eye splice: A—Start. B—Completed splice. C—Taper finish.

back again to tighten it as each strand is passed through. As each strand is dealt with the rope is turned round in position for the next. When one circuit has been completed the strands of No. 2 are woven into No. 1 and this process is repeated, the tier completing alternately a circuit at each end, pulling the strands up tight, and twisting the rope back to its original position to prevent slackness. Where a tidy splice is desired the strands may be gradually reduced in thickness by cutting out one or more yarns at each circuit. The finished splice will then taper gradually from the centre to the ends. When the splice has been completed it should be rolled underfoot on an even floor to lock the fibres. This greatly improves the appearance of the splice, and the loose ends of the strands may then be safely cut off close to the ropes.

Long Splice

The long splice is more difficult to make than the short splice, but it is neater and much better for pulley work. Since it is three or four times the length of the short splice, the strands must be laid back a correspondingly greater distance, that for ploughline being about 2ft. The rope ends are brought together in the same manner as for the short splice. A strand of No. 2 rope is then laid still further back up the rope and a corresponding strand of No. 1 rope is worked into place. In the same way a strand of No. 2 rope is worked into the place of a corresponding strand which has been laid back in No. 1 rope. As each strand is laid up into position sufficient length should be left over to work into the main rope for a finish. In a 3-strand rope each pair of strands should now project from the rope at the same distance from those remaining at the centre. (A, Fig. 25 shows one end of the long splice completed and the other strands ready for knotting and interweaving.) The splice is usually finished by taking about three-quarters of each pair of opposing strands and tying these together in the first loop of a reef knot, with the ends still pointing in the original directions. The six ends are then worked into the rope, each being gradually tapered off, the last fraction of each strand remaining being cut off and the end tucked into the rope.

Eye Splice

The eye splice will be found very useful on leg ropes or for a running noose. It is also frequently worked round a thimble for fixing to the end of a chain or wire, though this operation requires considerable practice. The strands are laid in the same manner as when the short splice is begun, the rope being doubled back to make the loop (A, Fig. 26). The loop is held firmly with the left hand and the strands, starting with the middle one, are woven into the rope with the right. When the rope has been doubled back the central strand should come over from the top, and the work should be begun by weaving this strand across, not with, the twist of the rope. Each strand is then taken in turn and worked alternately over and under corresponding strands of the neck of the eye, but always across the direction of twist.

Spliced Crown Knot

The spliced crown knot is made by crossing the strands above the crown as shown in A, Fig. 27. The ends of the strands are then pulled up tight; it will be found that they point backward along the rope, so that they can readily be spliced in as in an ordinary short splice. The splicing is desirable, as the crown without the splice is liable to come undone. This method leaves a large knob on the end of the rope (B, Fig. 27).

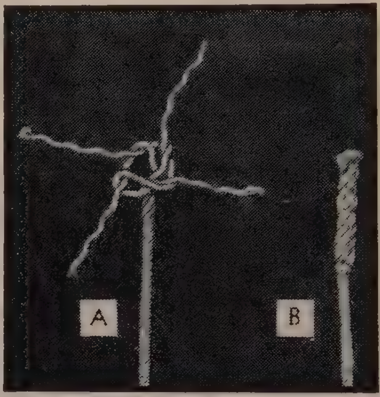

Fig. 27—Spliced crown knot: A—Start. B—Finish.

Crown Knot

The crown knot is in practice, the best and neatest of all finishes; it is made by laying back about 8in. (for ploughline) and then making a loop of one strand. The strand is then passed right round the rope and through the loop (A, Fig. 28). Each strand in turn is then treated in this way, passing through the original loop and its own loop until the last strand passes through all the loops. The ends are then pulled up tightly, when they may be cut off short with no danger of their coming undone (C, Fig. 28).

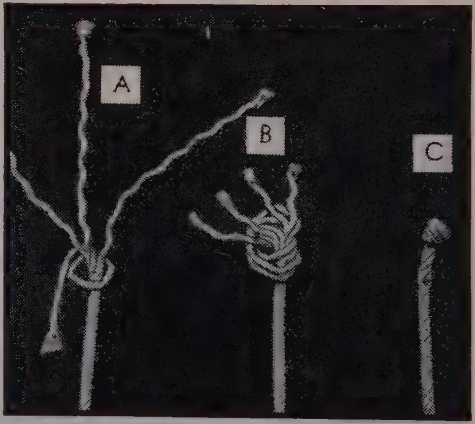

Fig. 28—Crown knot: A—Start. B—Strands looped. C—Strands tightened up and cut off.

End Splice

Trouble is frequently experienced with a rope unravelling from the end. Though this may be prevented by lashing the ends or by tying a knot, neither of these is quite as satisfactory as simply capping the end. To obtain an end splice the strands are laid back a few inches and a turn of each is taken round its neighbour. In a 3-strand rope the third strand after being turned round the second is passed upward through the loop formed by the turn of the first strand. All are then pulled up tight.

Acknowledgment

The assistance of Mr. Bruce Miller for drawings, Donaghy's Rope and Twine Company for manufacturing details, and Mr. J. Gibson for photographs are acknowledged.

FERTILISERS

THOUGH the threat of a world sulphur shortage is not felt as acutely now as it was 2 years ago, the long-term outlook for sulphur supplies is thought to have remained the same. For this reason investigations into phosphatic fertilisers which do not require sulphur for their production are being continued.

FUSED PHOSPHATES

AS the Department of Scientific and Industrial Research has produced experimental quantities of various forms of fused magnesium phosphates, for example, fusion products of phosphatic rock with serpentine or olivine rock, a large number of trials will be laid down comparing this locally made fertiliser with similar materials produced overseas. Already many trials have been conducted with fused magnesium phosphates imported from the United States of America and Japan. They are marked with various trade names. "Thermophos" and "Calcium magnesium phosphate" were produced in the U.S.A. and are not now available. "Fused magnesium phosphate" is produced in and available from Japan. "Thermophos" has been uniformly as good as or slightly better than superphosphate in the North Island and in all but the drier parts of the South Island. "Calcium magnesium phosphate" is included in several mowing trials and has proved slightly inferior to "Thermophos", particularly in one trial where the soil reaction has reached neutrality. There is evidence that the quality of the fusion products of rock phosphate with serpentine or olivine rock may vary and that, as in the case of "Thermophos", it may be as high or higher than that of superphosphate. Trials with "Thermophos" indicate that the powdered form is not significantly better than the granular product.

Part of a 9in. square indicating the spread of dye material in a trial to determine the effectiveness of applying sodium molybdate from the air.

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Double superphosphate gives nearly always the same stimulation to growth as superphosphate when applied at equivalent rates of phosphorus. On sulphur deficient soils, however, it is markedly inferior and on some unlimed hill country the difference in lime content between 3cwt. of superphosphate and 1½cwt. of double superphosphate has led to clearly distinguishable differences in pasture growth. In one trial this inferiority of double superphosphate has been more than made up by either the application of 3cwt. of limestone per acre or by 2½oz. of sodium molybdate.

METAPHOS AND FERTIPHOS

Metaphos seems sometimes slower acting than superphosphate and in one trial tended to be less efficient than superphosphate at about pH 7, but equally as good as superphosphate at about pH 6. Fertiphos (a lime reverted double superphosphate) has been used in many observational trials in the South Island and has consistently been inferior to superphosphate. Its lack of sulphur is thought to be the reason for this.

POTASH

Trials with potash extended to a number of soils. On yellow-grey earths of the South Island and North Island the currently used rapid soil analysis gave low levels of available potash. Results are conflicting. In some trials on the yellow-grey earths transitional to yellow-brown earths of the North Island slight responses have been reported. In the South Island results have been more often negative. Eight rate-of-potash trials were laid down in autumn 1953 or before on soils derived from Stratford ash and Ohakune ash, the annual average rainfall being 60in. or over. Rates of 1cwt., 2cwt., 4cwt., and in some cases 8cwt. of muriate of potash per acre were used. The plots topdressed at 2cwt. per acre appeared better than those receiving 1cwt. per acre. Muriate at 4cwt. per acre seemed in almost all observations to produce slightly more vigorous growth than the lighter rates. Muriate of potash applied at 8cwt. per acre caused depression in growth. Generally potash responses were only observed in plots receiving adequate dressings of phosphatic fertilisers. Whether dressings of more than 2cwt. per acre of muriate of potash would be payable has not been determined.

—*C. DURING*

* * * *

APPLICATION OF SODIUM MOLYBDATE FROM AIR

THE James Aviation Company, Rukuhia, is experimenting with the application by aeroplane of sodium molybdate in solution, and intends to lay down a range of trials in hill country extending from the Waimai Valley to Te Anga. The Department of Agriculture's Rukuhia Soil Research Station was asked to co-operate in determining the rate of application needed for adequate coverage. The aeroplane used is a Beaver fitted with I.C.D. spray equipment manufactured in California for blood worm control in Oregon forests and general duty spraying. A load of 180 gallons can be carried. The solution in the tank is fed into a spinning metal brush under each wing and flung out as a fine spray. To determine the distribution ⅝oz. of methylene blue was dissolved in 40 gallons of water in the tank. Strips of newsprint were run across the tarmac at right angles to the line of flight of the aeroplane, and the spread of blue specks was examined after each run. The runs were made at a height of 50ft. and an air speed of 95 m.p.h. into a light wind. After three preliminary trial runs a fourth with delivery at 4 gallons per acre gave an even spread over a chain width. In the illustration at left the spread of dye over part of a 9in. square is shown. The square is a fair sample of anywhere within the chain. The trial showed that under the wind conditions prevailing a very satisfactory coverage should be achieved. Nevertheless the movement of the spray shower during the preliminary runs showed that for accurate placement fairly steady air conditions would be required.

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Good Rearing of Dairy Stock

By C. P. McMEEKAN, Superintendent, Department of Agriculture Animal Research Station, Ruakura

THIS article is the second of a series dealing with the rearing of dairy stock and discusses rearing of calves from weaning to mating. The first article, which appeared in last month's "Journal", described rearing from birth to weaning, and the final article, to be published in next month's issue, will deal with the stage from mating to calving.

REARING from weaning to mating is the next most critical stage in the life of a dairy heifer. Good feeding and management up to weaning will have laid the foundations essential to the ultimate production of a normal, healthy animal. During this period these foundations must be consolidated. Many farmers, after an initial period of loss and relative unthriftiness during the first 2 or 3 weeks after birth of the calf, are able subsequently to handle their feeding and management problems so that their weaners are well grown. Careless management after weaning, however, soon destroys the progress made thus far and results in an animal with which an uphill struggle has to be fought to keep it going during the first winter.

The autumn-early winter period is thus the second most critical stage in the life of a dairy heifer. At this stage many thousands of animals are lost each year and many thousands of pounds wasted annually in expensive drenches and purchased feeding stuffs in attempts to undo mischief created at an earlier stage.

The Target

As a guide to the kind of performance that should be reached by well-fed and well-managed young stock after weaning the figures of Table 1 have been extracted from Ruakura data.

These represent "good" growth from weaning onward. In contrast, however, to the figures given for the first stage, which were arranged according to the age of the calf in weeks, these figures represent the average weight each month from January onward. The group concerned has the average age spread of 4 to 6 weeks typical of calves kept as replacements for a herd.

TABLE 1—GROWTH OF JERSEY YEARLINGS FROM WEANING TO MATING

Time month	**Liveweight** lb.	**Chest girth** in.
January (weaning) ..	290	44
February	320	46
March	345	48
April	367	49½
May	385	51
June	400	51½
July	410	52
August	428	52½
September	455	53½
October (mating) ..	505	55

This change from an age to a seasonal basis has been made on practical grounds. During the hand feeding period it is more necessary to treat each calf as an individual and to feed and manage it according to its age. After weaning, however, where the main feeding problem is one of efficient pasture management the calves must be handled as a group, so that a mean monthly weight figure is much more practical. This weight does not require any adjustment at any one time for the varying ages of the calves concerned. The target set calls for a weight of 345lb. in mid-March, of

Rearing from Weaning to Mating

1. From weaning to mating the growth target for Jersey yearlings should be 345lb. in mid-March, 400lb. in mid-June, and 500lb. at mating in October.
2. Severe losses can occur during the first winter under poor grazing management.
3. Rotational grazing management on milking-quality pasture ahead of the cows must be continued after weaning as the key to trouble-free rearing.
4. Drenching against worms is unnecessary in rotationally grazed cattle.
5. Supplementary feeding of hay and silage is required in summer and winter.
6. Vaccination against contagious abortion is a "must" for every heifer at 4 to 9 months of age.

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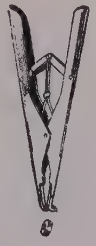

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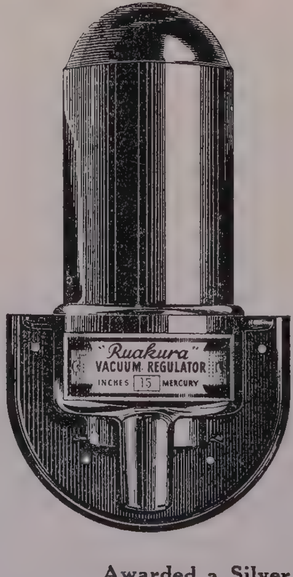

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PRICE 62/- each.

Manufactured by Plastic Products Ltd., Hamilton, New Zealand.

Awarded a Silver Medal by the London Dairy Show, 1953.

400lb. in mid-June, and of 500lb. at the time of mating in October. For the convenience of farmers not possessing scales chest girth measurements corresponding to these weights are shown in inches.

The liveweight growth curve corresponding to these weights is shown in Fig. 1. The possible spread in weights during each month above and below this "good" growth curve is illustrated by shaded areas. Above the large middle line growth can be considered very good, the top line representing first-class performance with grade Jersey stock; below the middle line growth is poor and within this zone trouble can be expected; the bottom curve represents about the minimum growth-rate which can be maintained without heavy mortality in early winter. Even when scales are not available this curve can be used to check up the performance of yearling stock. The method is to convert the average chest measurement of the group in any month to its approximate weight equivalent, which can be read off from Table 1, and to locate the position of this weight on the graph.

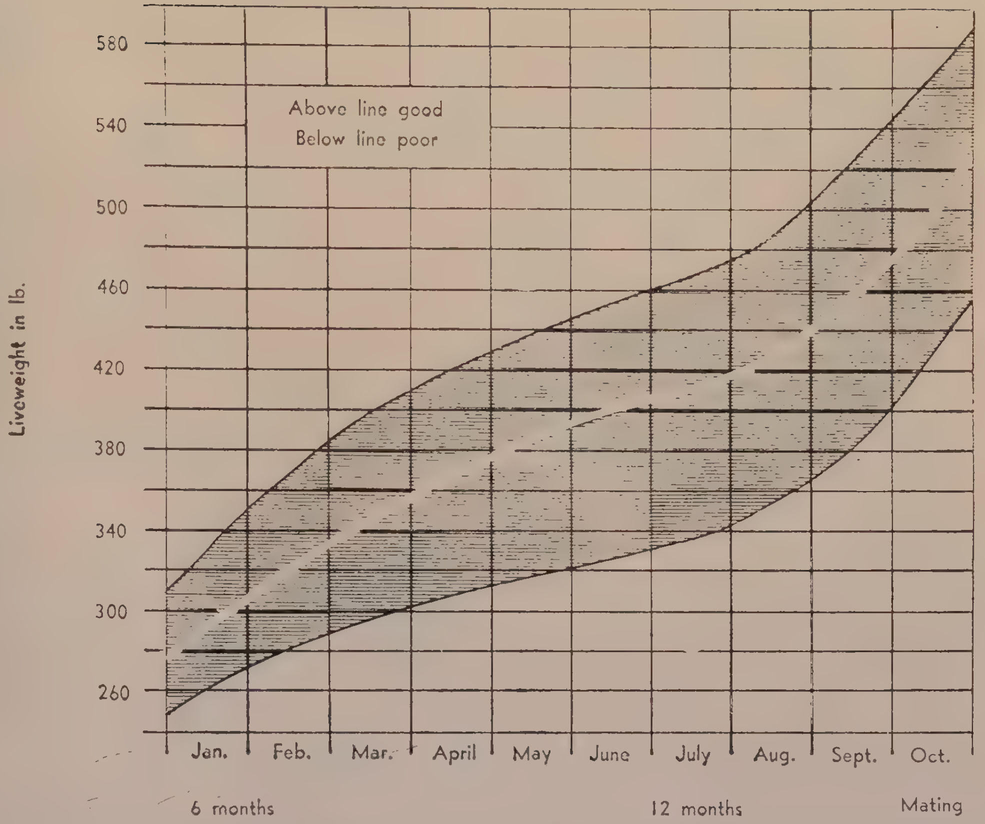


Fig. 1—Growth curve from weaning to mating. For good growth in Jersey weaners the middle curve or the shaded area above it should be aimed at. When weights fall in the shaded area below the middle curve trouble should be watched for.

Grazing Management

Obviously, since the heifer is now depending entirely on pasture and pasture supplements—hay and silage—the question of feeding to obtain the growth-rates set out on page 481 is practically entirely a matter of grazing management.

Because of the heavy losses experienced on dairy farms throughout the more extensive dairying areas some 10 to 15 years ago a great deal of research has gone into the study of different grazing systems at Ruakura. It seemed evident from post-mortem records of calves lost during the first winter that though all such cases showed heavy worm infestation with associated gut and lung troubles, the primary cause was probably due not to parasites but to incorrect feeding, which eventually allowed worms to gain the upper hand. The results of all experiments have borne out this general view.

In principle young dairy stock may be managed after weaning under one or other of two essentially different grazing systems. They may be set stocked, by which is meant that they are turned into a relatively large field containing plenty of pasture and left there for weeks and sometimes months at a time, being shifted only when it is obvious that the feed supply is becoming scarce. At this stage a shift is made to a similar field and again the animals remain there for a considerable period.

Alternatively they may be shifted round the farm on a rotational plan, being given access to new fields of fresh, leafy pasture at frequent intervals. In practice, of course, all sorts of modifications of these two techniques exist.

Comparison of Two Systems

To determine the effect of the two methods on growth-rate a long-term experiment has been in progress at Ruakura. The results are of profound importance to dairymen in pointing the way to trouble-free calf rearing during the post-weaning stage.

Each year for 10 successive seasons two comparable groups of calves have been used. One has been run on a set stocking plan and the other under a rotational grazing system. The experiments have been carried out on two farms equal in area, of the same soil type, with similar pastures, and carrying the same number of stock. Topdressing has been identical on each farm. One farm has been managed on a "night paddock-day paddock-dry stock paddock" set stocking system requiring a minimum of subdivision and relative continuous grazing over the whole area. The other has been closely subdivided into 17 fields to permit the practice of controlled rotational grazing of all the cattle thereon. The milking herd has been handled on a daily shift basis, with each field being grazed as far as possible when carrying 4 to 6in. of leafy herbage. Full use has been made of the mower to control rank growth. Both hay and silage have been saved to make full use of the surplus growth of the spring flush period.

These two farming systems have lent themselves admirably to comparison of set stocking versus rotational grazing in the rearing of young stock. The set stocked calves have been reared in a calf paddock from birth to weaning at 18 weeks. The rotated animals have been shifted round the milking pastures ahead of the dairy cows on a daily shift basis from 2 weeks of age until weaning at 18 weeks, as recommended in the previous article in this series. After weaning the set stocked calves have been transferred to a dry stock paddock containing ample feed. Rotational movement of the other group has continued without break except for an extension of the period on any one field to 2 and sometimes 3 days at the very most to suit pasture conditions operating in the different seasons.

Fig. 2 illustrates the class of yearling resulting from the two systems. These animals are all a year old and at the time the pictures were taken there was a body weight difference of 140lb. between the two groups, a difference produced entirely by grazing management. Table 2 sets out the average liveweights of the two groups at different stages for the 10 years of the experiment. Over 100 calves are involved in each case.

TABLE 2—EFFECT OF GRAZING MANAGEMENT ON GROWTH

Treatment	Number	March (8 months) lb.	March (20 months) lb.
Set stocked ..	127	291	586
Rotational ..	118	396	744
Differences		105	158

Not only are the differences extremely large at each point, but it is outstanding that they have been virtually of the same order from year

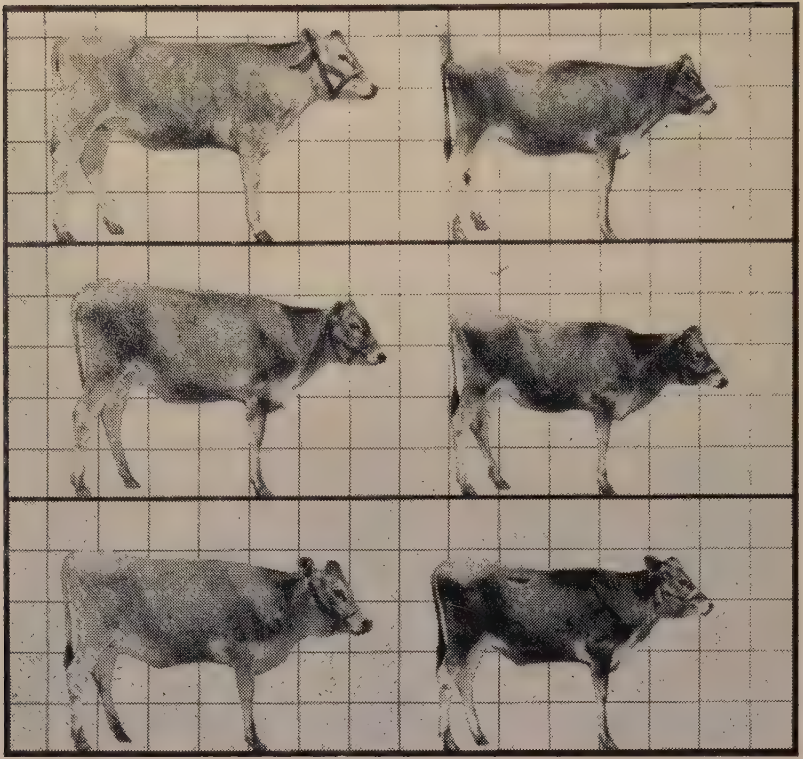


Fig. 2—Yearlings showing the effect of grazing management. Left—Rotationally grazed. Right—Set stocked.

to year. This applied even to the drought year of 1945-46, when even under controlled grazing conditions pasture production slumped badly as a result of a 13-week period without effective rain.

Equally noteworthy is the fact that not a single calf reared on a rotational grazing plan has ever been drenched against worms. In contrast, to ensure that set stocked animals survived so that the effect of the poor rearing on milk production could be measured regular drenching every 3 weeks has had to be resorted to. Before the introduction of drenching for this purpose losses of up to 50 per cent. of calves in the set stocked group were experienced in severe winters. Periodic examination of faeces has shown that the rotated calves carry a worm burden not very different in numbers from that of their set stocked mates for most of the year. This infestation apparently never worries rotated calves; it obviously does so in the case of the set stocked animals.

Grazing Behaviour of Calves

The explanation for these marked differences in growth-rate and thrift has already been given in the previous article when the selective grazing behaviour of calves was discussed. A grazing behaviour study of calves under the two systems carried out in midsummer about 2 months after weaning is revealing in indicating basic differences in the reaction of calves to pasture under different conditions. Thus from Table 3 it will be observed that at the same time of the year set stocked animals had to work much harder to make less growth than their rotated mates.

TABLE 3—EFFECT OF GRAZING MANAGEMENT ON GRAZING BEHAVIOUR

	Grazing time hours	Bites per minute	Cudding time hours
Set stocked ..	9	35	7¾
Rotational ..	7½	48	6¾

Hours of grazing were longer, the calves needing more time to find suitable food among the long and short patches of growth typical of set grazing management. Grazing rate was slower, the set stocked animals wasting much time in their search for suitable food. The poorer quality of the pasture eaten is indicated by the longer ruminating times, which show that more work was required in its digestion. Because of a high fibre content and consequent lower digestibility set stocked animals had to spend more time in chewing their cud in an attempt to utilise the less suitable fodder.

The results from these experiments have proved so consistent over the years that the adoption of a rotational grazing system of management from weaning onward cannot be too strongly recommended. To farmers aiming at achieving the good to better growth performance illustrated in the heading photograph of this article and wishing to do so without worry, without drenching, and without loss rotational grazing management undoubtedly provides an easy answer.

As a practical guide the following points should be emphasised:—

1. Shifting should be as frequent as possible, with daily shifts the ideal. Five days in any one field should be regarded as the maximum.
2. Calves should be shifted to fields containing pasture of milk-producing quality.
3. Calves should graze these fields before they are made available to the milking herd, a week to 10 days before being a practical technique.
4. A minimum of 14 to 20 paddocks must be provided to exploit fully a rotational grazing plan for both milking and young stock.

Supplementary Feeding

Though the basic principle of good pasture management is thus "movement", whatever the feeding conditions operating, periods of definite pasture shortage have to be allowed for. For this purpose the best-quality hay and silage are required. Hay cut before the flowering stage should be offered to calves, especially during the period of pasture recovery in the early autumn after the commencement of rains after a dry summer. The pasture at this time tends to be soft and lush. It is so different in its nutritive qualities from the harder, drier feed characteristic of summer forage that the sudden change frequently causes a slowing down of growth in calves even under a well-managed rotational plan. The provision of hay at this time helps to cover the transition period until the pasture hardens.

Hay must also be provided during most of the winter and a ration of 5 to 8lb. per day per yearling should be regarded as a basic requirement.

Good-quality silage made from short, leafy pasture and made in such a way that it is highly palatable can be of considerable assistance in dry summers. A daily ration of 5 to 10lb. per calf will be readily consumed by thrifty animals at this time. Its consistent use will be amply repaid by less trouble later in the winter. Silage should also be used with hay during the winter when a ration of 10 to 12lb. should be provided. Well-reared heifers at Ruakura over the past 10 years have required 5cwt. of hay and ¾ ton of silage per head during this stage.

Maintenance of Health

Three major health problems exist during this period: Stomach and intestinal worms, lungworms, and contagious abortion.

Stomach and Intestinal Worms

All calves are likely to become hosts to internal parasites which are picked up from pastures.

Stomach worms are found in the fourth stomach and intestinal worms in the first part of the small intestine. When present in very large numbers they cause a progressive loss of condition. In severe cases diarrhoea and general debility may be marked. Because of their small size (about the thickness of a fine hair and up to ½in. long) worms are easily missed on post-mortem examination.

Worms are most commonly associated with severe unthriftiness and losses after weaning, particularly at the 8 to 10 months stage. This latter period coincides with the onset of the poorer feed conditions of late autumn and winter. From March onward is thus the crucial time.

There is still much debate among experts about whether the worms are the prime and initial cause of unthriftiness or whether unthriftiness merely allows worms to increase to such numbers that they deal the final knockout blow. This is a little like

Fig. 3—Set stocked yearlings in winter. These are typical of stock reared under this method of grazing management.

the old argument about which comes first—the hen or the egg. Whatever the situation, it is at least quite definite that calves managed both during the pre- and post-weaning stages of growth on the rotational grazing plan described in this series of articles never have to be dosed against worms and never show any ill effects from the worm burden they carry. Prevention is thus simple and effective.

Where careless grazing management has allowed worm infestation to reach a level where it is associated with unthriftiness dosing with phenothiazine, at dose levels recommended by the manufacturers, should be practised and repeated every 3 weeks until the calves have obviously recovered their normal growth-rate. Dosing alone is not likely to be effective. It should always be associated with frequent changes to the best available pastures. Returning sick calves to set stocked pastures merely perpetuates the trouble. Phenothiazine may cause a severe eye condition and temporary blindness. This can be avoided by keeping calves out of direct sunlight during the day following drenching.

Lungworm, Husk, or Parasitic Bronchitis

Trouble from lungworms is often prevalent in wet seasons. Calves are most susceptible at the weaning and immediate post-weaning stages. The parasite directly responsible is a small roundworm which gains entry by being picked up from pasture in the larval form. These larvae penetrate the intestine, travel via the bloodstream, and settle in the lungs, where they grow into mature worms.

The most characteristic symptom of the disease is a persistent husky cough and heavy breathing which is especially severe after strenuous exercise. Where infestation of the pasture is heavy, as often occurs when warm, moist climatic conditions exist, a lungworm burden may occur severe enough to cause pneumonia and death. Frequently, however, lungworm and stomach worm are present together, both species liking the same climatic and environmental conditions, so that it is often difficult to assess which parasite has been responsible for death.

An accurate diagnosis of the disease may be made after death by cutting down the windpipe into the deeper bronchial tubes and observing white, thread-like worms in masses. An accompanying pneumonia may be present, indicated by solidification of lung tissues. There is no medicinal treatment effective against adult lungworms. Preventive measures consist of good feeding management to build strong, resistant calves.

It has been characteristic of the rotational grazing technique described in this series of articles that no calf so managed at Ruakura has shown signs of unthriftiness because of lungworm. Set stocked calves have not been so fortunate.

Contagious Abortion

Until recent years contagious abortion in heifers and cows has been a widespread disease causing a huge annual financial loss to dairy farmers in New Zealand. It is due to a specific bacterial organism called *Brucella abortus*. Brucellosis can be controlled by vaccination. The discovery and use of an efficient vaccine which immunises animals against the disease has reduced its incidence to negligible proportions even on farms where formerly it was difficult even to rear enough replacement stock.

Vaccination of young female stock is a "must" and should be carried out annually as a routine measure on every dairy farm in New Zealand. This may be done at any age from 4 months up to the time of first mating. For practical reasons it is now the accepted procedure for Veterinarians and Livestock Instructors to vaccinate calves between January and May.

Vaccination against contagious abortion does not result in any greater difficulty in getting them in calf later. If infertility appears to be associated with vaccination in a group of heifers, other causes should be looked for.

Fig. 4—Good-quality hay should be offered when feed is soft and lush and in winter, when feed is scarce.

Honey House Construction and Layout of Plant

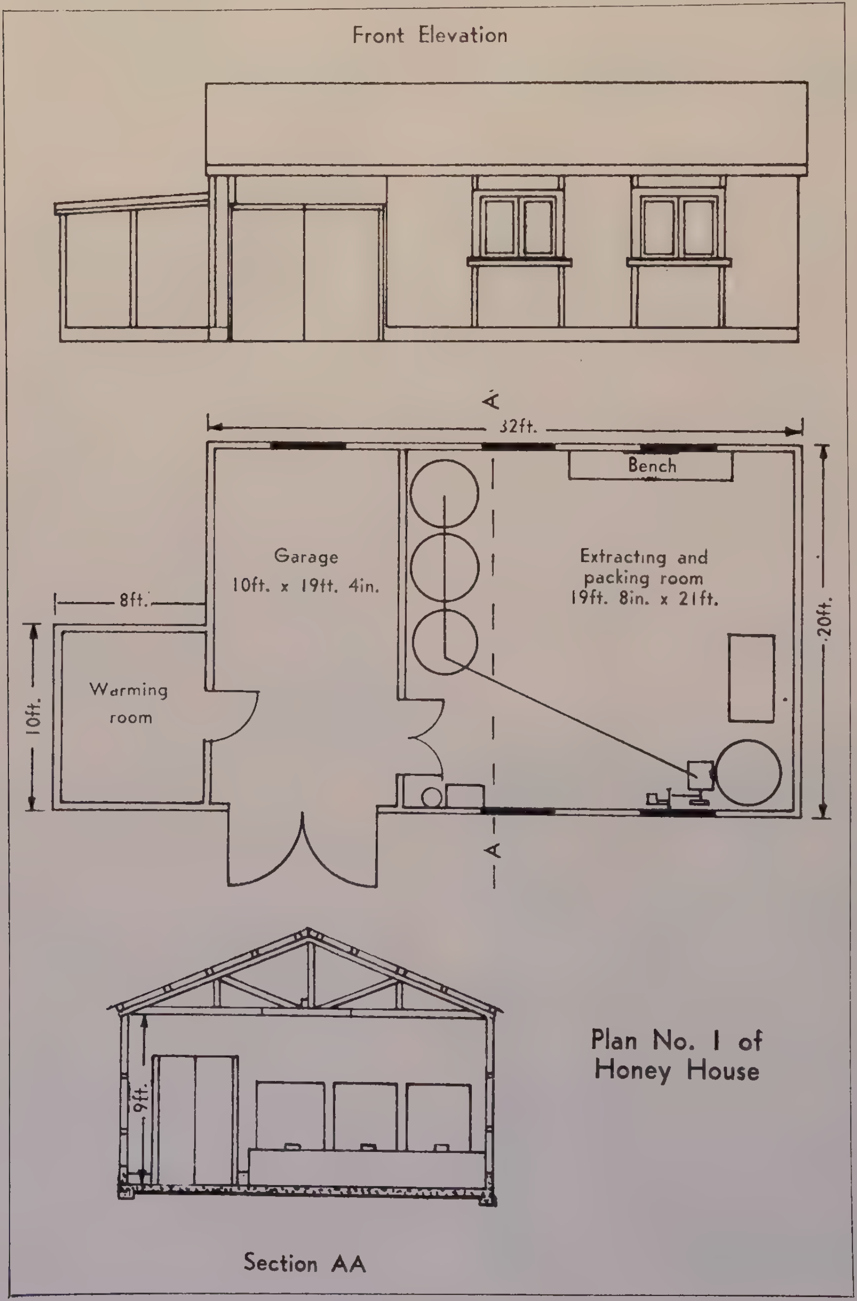
TWO designs of honey house are featured in this article by L. H. Johnson, Apiary Instructor, Department of Agriculture, Palmerston North, which is the first of a series on honey house construction and layout of plant. It is not intended to provide building specifications complete in every detail, but only to give a general outline. Some major and some minor features would be applicable only to honey houses; otherwise the construction in general would be in accordance with ordinary building practice.

NO. 1 plan is of a ground floor building designed for economy in building and No. 2 plan is of a two-floor structure in which the gravity system is used to deliver honey from the extractor to the tanks. Four main considerations may govern a building undertaking:—

1. A reasonable capital outlay.
2. Structural design in accordance with building by-laws.
3. The inclusion of materials and fittings to conform with the Food Hygiene Regulations 1952.
4. Situation.

No. 1 Plan

No. 1 plan is a simple design in which economy in building and provision for future additions have been borne in mind. There is sufficient floor space in which to work for extracting and packing the crop from a 400 hive holding. It is suitable for a level section.



Plan No. 1 of Honey House

General Construction

The floor and foundation walls are of concrete. To obtain a smooth finish the floor should be topped with neat cement and smoothed off with a steel float. The angle between the floor and dwarf wall should be rounded off with cement "compo". It would also be preferable if floors were painted with a good floor paint, which would prevent any spilt honey from discolouring the surface.

There should not be any need to hose and scrub the concrete floor as in a dairy factory.

Timber framing may be of 4in. x 2in. scantling. A scarf should be cut in each plate and in each of the two dwangs between the studs for ventilation of the walls.

One of the most economical materials for the sheathing of exterior walls is asbestos cement flat sheets. This material is easy to make bee proof and is very durable, but will not stand much abuse. Clout nails should not be driven into it severely nor should there be any tension on the sheets or later they will crack.

Each pair of rafters should be tied and strutted as shown on the cross-section drawing (section AA). Wire netting should be stretched over the purlins and then covered with impregnated building paper.

The roof covering may be iron, aluminium, or mineral fibre corrugated sheets.

Fix 5 casement 2-light windows with opening sashes each 3ft. 6in. x 1ft. 10in. where shown on the plan. Wire gauze screens may be hinged to open inward.

Cover the inside walls with wall board and the main ceiling with wood pulp soft board. It is necessary to coat the walls and ceiling with washable paint; some of the near-white plastic paints are excellent for this purpose.

Access to the extracting and packing room is through a pair of doors each 2ft. wide, which will allow for extracting equipment to be moved in.

Garage

The garage is of the same construction as the main building, but it is not lined.

Warming Room

There is space to build a lean-to warming room on the end of the building. This adjunct is desirable, but not a necessity.

Double inside walls, a ceiling of wood pulp soft board, and a wooden floor on top of the concrete will provide satisfactory insulation. The door also should be insulated.

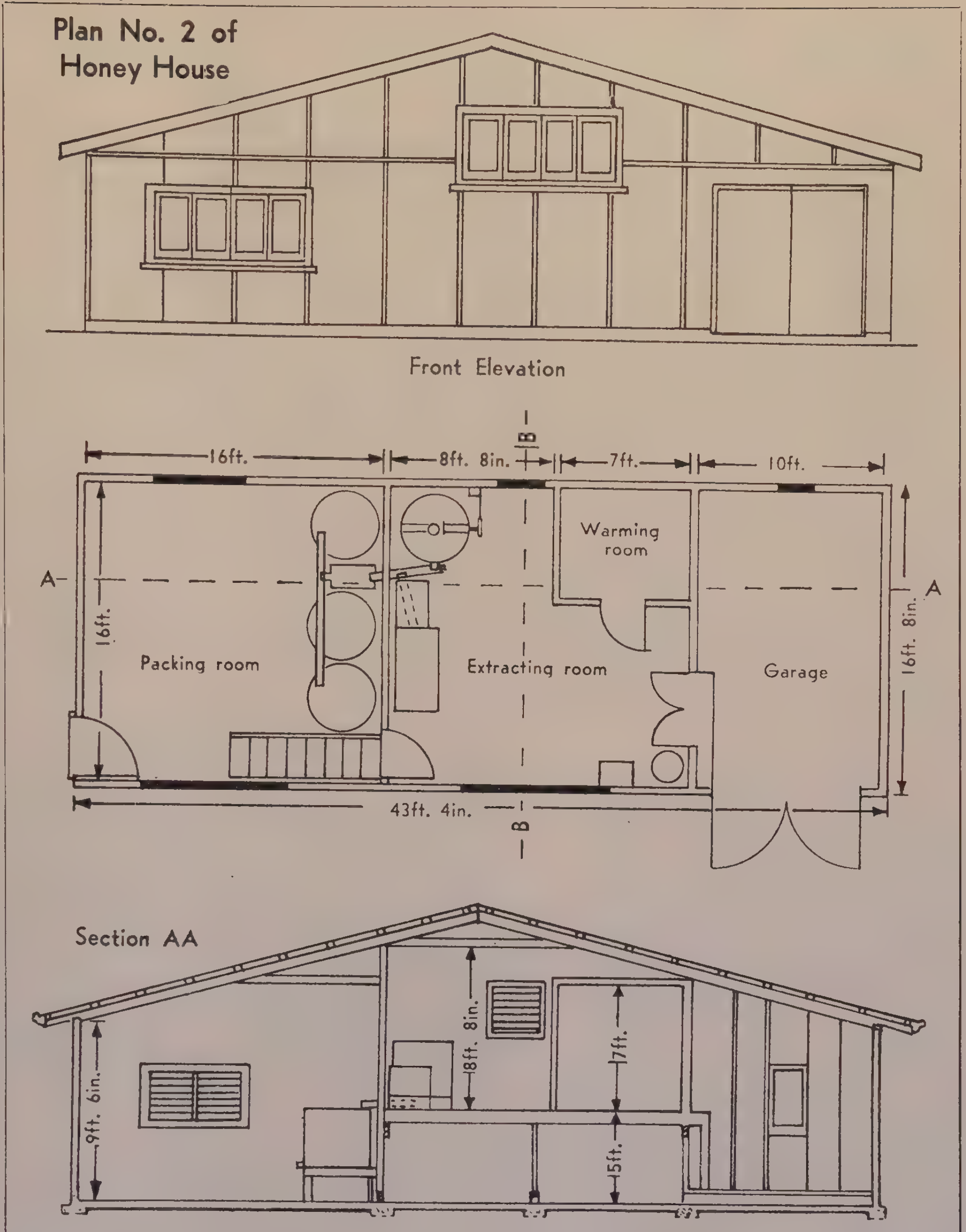
Provision for Extension

If an extension is contemplated, it may be built on to the end of the building without very much alteration to the existing work.

Extracting and Packing Plant

The setting up of honey house equipment need not conform to any one fixed idea.

An arrangement of plant with the extracting and packing equipment near the walls (without windows) leaves the maximum of floor space for the easy handling and temporary accommodation of honey supers and containers. It is a matter of choice for the beekeeper whether he sets the capping melter on the right or left of the extractor. The proposed set-up is to anchor the extractor on a stand at least 14in. high so that a small tank may be placed on the floor under the honey gate. Honey is then pumped from this small tank through a pipe running up and overhead to the tanks against the opposite wall. In a combined extracting and packing house it is important that all tanks should have covers. An arrangement whereby an electric switch operates a motor to work the pump and is controlled by a float in the small tank will give automatic control of the delivery of honey from the extractor to the tanks.


Plan No. 2 of Honey House

Front Elevation

Section AA

Storage of Supers

There is room for the storage of 200 supers during winter, but the job of packing and disposing of the honey crop would have to be well organised to get the necessary floor space.

Workshop

A bench could be set up in the end of the garage to provide a workshop.

Facilities for Washing

A washhand basin is a necessity. The majority of honey houses are within an area where water may be laid on, but if not, it would be necessary to set up a tank to store rainwater from the roof.

Hot water may be supplied by an electric sink heater.

No. 2 Plan

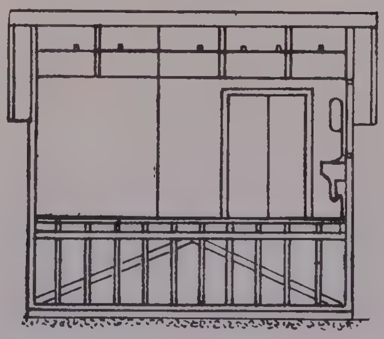
The No. 2 plan building is designed so that honey may gravitate from the extractor on the top floor to the tanks on the lower level. Like No. 1 plan the building is designed for a level section.

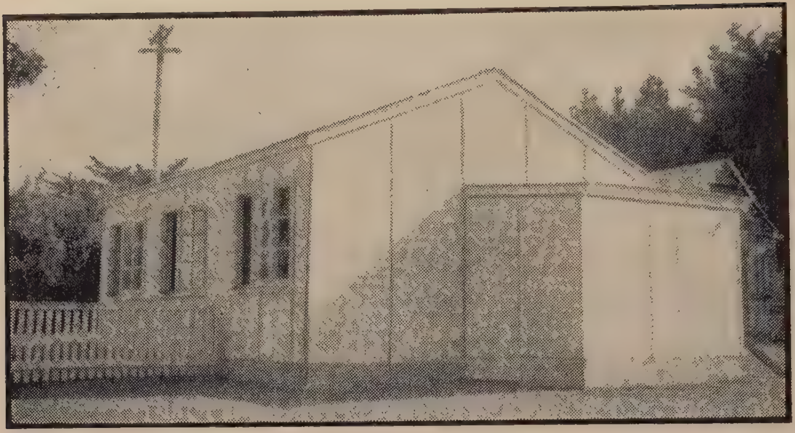
The building will cost more than one built to No. 1 plan.

General Construction

The concrete foundation walls and floor run right through at the one level; the building materials outside and inside are the same as in No. 1 plan, except that the rafters are 6in. x 2in.

Section BB





Honey house built to No. 1 plan.

To simplify the roof construction and give the best outside appearance the top plate line is kept at one height and the roof ridge is set at half the total span. Ceilings die into the roof.

Non-corrodible flashings should be built into all horizontal joints in the asbestos cement sheets, including all window and door heads.

Extracting Room

A wooden floor 1in. thick is fixed to 10in. x 2in. joists, which are carried on the ends by a ribbon board and supported in the centre by a row of studs bolted to a cross-foundation wall. The minimum height of the top floor is governed by the height of a tank, space under the gate for a bulk container, and fall for the chutes. Provision is made for an insulated warming room. In some localities it may be preferable to use it as a cooling room. The roof and ceiling are kept reasonably low to avoid unnecessary height in the packing room and garage.

Packing Room

A short stairway is necessary to give access to the extracting room. Strings and treads may be of 10in. x 2in. timber. A hand rail should also be fixed on the side between the stairway and the tanks.

Tank stands may be built of 4in. x 2in. uprights and bearers with 1in. decking. If the top of the decking is 20in. from the concrete floor, this will allow for a 60lb. honey tin to stand on a set of scales and go under the honey gate. A tank with a diameter of 3ft. 8in. and height of 2ft. 10in. holds approximately 1 ton of honey.

Garage

The garage is part of the main building and has been designed to avoid unnecessary height of walls. The inside walls and ceiling are not lined.

Lighting

So often honey houses have small windows, which do not admit enough daylight, and some beekeepers even resort to artificial light.

Two 4-light windows with 3ft. 6in. x 1ft. 10in. sashes on one side of each room and a glass adjustable louvre on the opposite wall should give adequate light and ventilation.

A washhand basin is fixed on the outer wall in the extracting room and hot water is provided by an electrically heated cylinder.

How Gravity Plant Will Operate

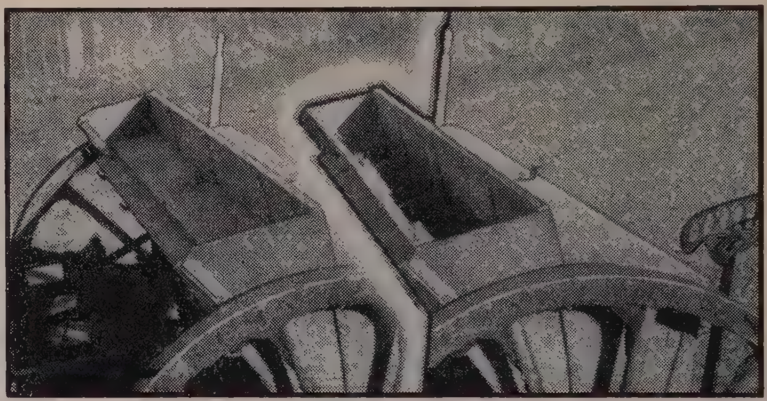
A loaded truck may be driven into the garage and unloaded on to the extracting room floor. The decks of most trucks are from 3ft. 6in. to 4ft. from the ground, so that it is quite practical to unload full supers on to the extracting floor at a higher level and then to move them into the warming room. The extracting plant, being near the partition, is out of the way.

Honey will flow through chutes from the extractor and cappings melter or draining trough to the tanks in the packing room below.

Extra Supers of Combs

Though there is limited room in the building for the storage of supers of combs, it is not the ideal place for storing this equipment, as the honey house is a place for the preparation, packing, and sale of a food. Bee comb storage will be dealt with in a later article and several other designs of honey houses will also be given in future articles.

Enlarging the Seed Box of a Grain Drill



A SIMPLE and effective method of enlarging the seed box of a grain drill is shown in the accompanying illustration. It shows the addition made by Mr. E. Forbes on the grain drill of Mr. W. F. Wharton, Kauru Hill, near Oamaru. For growers who have large acreages of grain and large paddocks this extension has considerable advantages. When cereals are being sown it is frequently the seed box which limits the drilling area, as at the rate of 1cwt. of fertiliser per acre the standard seed box is usually empty before the fertiliser box needs refilling.

The attachment shown has been used for a number of years on this farm and has proved its worth. It is simple to add and has not increased the weight enough to have any detrimental effect on the axle of the drill. The extension doubles the capacity of the seed box. It is made by placing a 6in. x 1in. piece of timber on its edge along the length of the partition between the usual seed and grain boxes, and fixing it in place by pieces of iron and bolts as shown. The extension, with the lid closed, is shown on the left of the illustration. To each end of the grain box a sheet of flat iron is attached and fixed to the upright 6in. x 1in. piece of timber at the back. It is shaped in front to fit the angle of the lid of the grain box when it is open and a support in this position is bolted to the flat iron plate to keep the open lid in place. The two ends, the 6in. x 1in. piece of timber, and the lid of the box in the open position thus complete the extension. The double capacity of the seed box, obtained by keeping the lid open, is shown on the right of the illustration.

—*W. R. LOBB, Instructor in Agriculture,*
Department of Agriculture, Oamaru

HEADING PHOTOGRAPH: **Breeding turkeys on free range.**

Turkeys and Geese a Profitable Sideline

Notes for the Household Poultry Keeper

TURKEY raising on a commercial scale is not common in New Zealand, but it forms a profitable sideline for many farmers. With prices high at Christmas and other seasonal holidays the monetary return for the limited expense and work involved is highly satisfactory. In this article on rearing turkeys and geese some of the diseases and pitfalls associated with these birds are discussed by H. K. Mullins, Poultry Instructor, Department of Agriculture, Hastings.

THERE are several breeds of turkeys, but the American Bronzewing is by far the most popular in New Zealand. It is a large bird with the hens weighing 12 to 16lb., and the gobblers from 20lb. upward, depending a good deal on the age of the birds. Two- and three-year-old gobblers run in ideal conditions may easily weigh 30lb. However, a very large bird is usually too big for the average family, and definitely too costly. Agencies such as hotels are an outlet for particularly heavy birds.

The essentials for success in producing turkeys are sound, healthy breeding stock, careful feeding and management of the young stock, and marketing at the right time.

Breeding

The breeding stock should consist of 5 to 7 hens mated in their second season with a gobbler not less than a year old. Breeding from fully matured stock is essential and applies to turkeys as well as poultry. Exceptionally heavy male birds should not be used; their fertility is often poor and they can quite easily injure the hens. Should the male bird possess very sharp spurs, these can be removed in the same way as with poultry. With someone holding the bird firmly, a lighted match should be applied to the spurs for a few seconds, and then the case should be removed with a pair of pliers. The operation will not hurt the bird and is most effective.

The gobbler should be of robust consituation, should have good wide shoulders, and should be long in the breast and comparatively short in the leg. If such a bird is mated with average-sized hens, offspring of a desirable size and constitution should result.

Turkey eggs should be hatched by turkey hens where possible, though other hens may prove quite satisfactory. Mixed results have been obtained from hatching turkey eggs in kerosene and electric incubators and hens are still recommended for this purpose to the household turkey keeper. Turkey hens sit best when they make their own nests. Sometimes it is necessary to provide a little additional shelter to make the nest secure from hawks and other pests. Feed and water should be placed handy to the nest so that the hen can help herself. Wheat or maize is the best feed for sitting hens. The time of incubation is 28 days.

The turkey hen should be examined for lice immediately before she begins to sit, and if she is found to be lousy, she should be dusted with insect powder. Failure to do this may result in the hen deserting the nest before the poults have hatched.

Rearing and Feeding

There is no material difference between rearing turkey chickens and other chickens. When the chickens hatch they do not require food for at least 24 hours. To encourage turkey poults to eat and drink, coloured marbles placed in food and water receptacles attract their attention. Their first feed can consist of fine chick food, but some prefer to give rolled oats or very coarse oatmeal. Hard-boiled eggs rubbed up with biscuits are also an excellent starter feed for the young poults, but care should be taken to see that it is eaten up after each meal or bowel trouble may result. After a few days ordinary chick mash containing 10 per cent. of meat meal and 10 per cent. of milk powder may be fed to the chickens. Chopped greens may be fed after 4 days; chopped onion tops, silver beet, or dandelion make excellent greens for turkey poults.

Turkeys do best on a fairly high protein diet, and meat or liver meal plus skimmed milk powder should be added to the mash for the first few

Broody turkeys in a cage which is suitable also for a broody hen and poults.

weeks. The more milk young turkeys get the finer will be the texture of flesh. After 6 weeks whole wheat or cracked maize may be given.

The main losses with turkey poults occur in the first few weeks after hatching. These losses result from the turkey hen allowing her brood to get wet through foraging in long wet grass. Experiments have shown that if the hen and chicks are confined to a coop for the first month, the mortality will be considerably lowered. The coop can be moved each day on to fresh ground. On the fifth day it should be lifted slightly at one end to permit the poults to run out while the hen remains confined. Where cats are a menace the hen and poults are better confined in a shed rather than a coop where their area of confinement is very limited.

Diseases of Turkeys

Blackhead

Blackhead is very common in turkeys and in chickens to a less extent. Poults 3 to 4 months old seem most susceptible to the disease, but turkeys of any age are prone to blackhead. Typical symptoms are similar to those for so many other diseases in that the poults appear listless, are not so active in searching for food, and when fed eat very little. As the disease progresses the wings and tail droop, and the head may appear very dark, hence the name blackhead. A yellow diarrhoea is common, and blood may also be seen in the droppings. This latter feature has caused some confusion with poultry keepers, being typical of coccidiosis in chickens. Occasionally yellow lesions will be seen on the liver and also in the caecum or blind gut.

Treatment: Until recently there was no drug available for blackhead, and losses were heavy from the disease. There is now available a drug known in New Zealand as "Entramin", which is most effective when used immediately the disease is first noticed. "Entramin" can be used as a preventative also and should be given according to the manufacturer's instructions.

Geese

The popularity of geese as table birds has never increased to any extent in New Zealand. However, a good many of these fine birds still make attractive and appetising Christmas dinners for many people in this country. A small flock of geese, properly handled, can become quite an acquisition as a sideline on any farm. In some parts of the world goose farming is carried on on quite a large scale. New Zealanders are not, however, a great poultry eating country and it is questionable whether geese will ever become anything more than a sideline on farms and stations in this country.

Breeding

Mature stock of 2 years or over should be used for breeding. The goose is long lived so that the necessity of continually replacing the original stock is unnecessary. Birds of 7, 8, or even 10 years are suitable as breeders, though they will live to a very much greater age. Three or four geese can be mated with one gander. The incubation period varies from 28 to 32 days. Goose eggs can be hatched under ordinary hens, but usually 4 to 6 eggs is all that an average sized hen can cover satisfactorily. Goose eggs are not easily hatched in electric incubators, better results being obtained by letting the goose sit on her own eggs.

Feeding Goslings

The young goslings need not be fed for 36 hours after hatching. Ordinary chicken mash mixed crumbly is as good as anything to start the goslings on. This can be continued for a month, after which the goslings will find a good deal of their own feed in the paddocks. Grain can be given after 3 weeks, but this is not really essential with geese. However, a good supply of succulent greenfeed is most important, grass, rape, or lucerne being highly appreciated by young and old birds. Goslings grow very quickly and are ready for the table at 10 to 14 weeks. Given average attention, geese are very easily reared. Disease of any sort is most uncommon among this hardy breed.

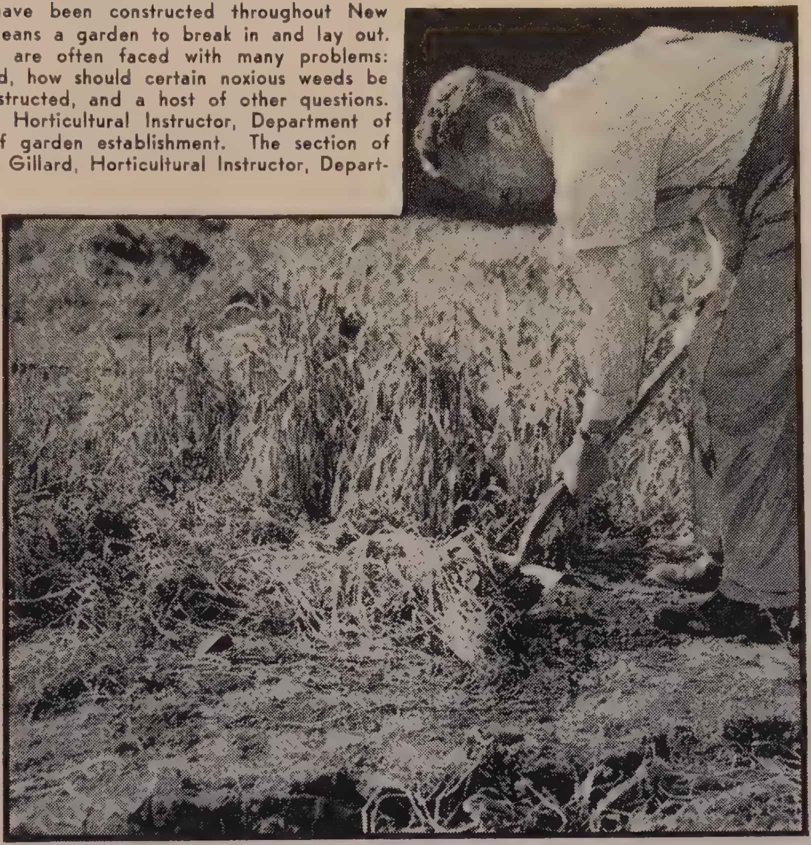
Photographs by Robertson.

Meteorological Records for March

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	65.2	+ 1.4	81.3	46.9	8.13	11	+ 3.95	3.04	6	146.0
Auckland	160	66.5	+ 1.6	78.2	49.2	10.54	17	+ 7.39	3.19	14	137.9
Tauranga	10	64.8	+ 2.2	78.0	45.8	6.05	15	+ 1.95	1.62	6	187.0
Ruakura	131	62.8	+ 1.6	78.0	41.3	7.71	16	+ 4.73	2.09	8	133.6
Rotorua	975	62.4	+ 1.9	81.1	42.5	7.83	12	+ 3.96	2.69	7	177.6
Gisborne	12	64.6	+ 2.6	83.6	41.9	7.77	15	+ 4.07	1.77	30	181.2
New Plymouth ..	160	63.8	+ 2.8	79.0	41.8	4.31	16	+ 0.57	1.49	8	155.4
Karioi	2125	58.4	+ 3.3	76.5	37.7	4.42	14	+ 2.08	1.25	30	
Napier	5	64.8	+ 2.4	81.0	44.7	4.54	11	+ 1.96	2.72	31	170.9
Wanganui	72	65.2	+ 3.6	83.1	46.6	3.93	11	+ 1.78	1.44	30	148.8
Palmerston North .	110	63.8	+ 3.5	79.9	43.4	3.89	15	+ 1.66	1.15	8	134.3
Waingawa	340	61.8	+ 2.8	79.6	39.0	5.74	16	+ 3.54	1.65	31	149.8
Wellington	415	62.6	+ 3.2	78.0	44.1	5.16	15	+ 1.98	1.95	29	175.1
Nelson airfield ..	5	62.0	+ 3.6	80.0	39.9	5.94	14	+ 3.25	2.32	20	193.6
Blenheim	12	62.3	+ 2.4	79.2	39.1	2.38	8	+ 0.85	0.90	20	199.1
Hokitika	15	58.6	+ 2.3	78.2	41.7	14.05	19	+ 5.11	3.07	14	161.9
Hanmer	1270	57.9	+ 1.7	82.0	33.0	3.45	15	+ 0.09	1.25	29	155.4
Christchurch ..	22	60.2	+ 2.1	79.7	37.7	1.51	12	— 0.43	0.88	8	160.9
Ashburton	323	60.4	+ 2.6	82.8	36.4	2.35	9	+ 0.15	0.84	29	159.4
Timaru	56	60.7	+ 3.3	79.0	38.7	1.89	9	— 0.24	0.60	8	157.8
Alexandra	520	60.1	+ 2.5	82.7	32.9	1.54	12	+ 0.39	0.28	28	182.1
Taieri	80	57.7	+ 2.5	78.1	37.2	4.15	15	+ 2.08	1.71	7	155.8
Invercargill airfield	0	55.6	+ 1.8	76.0	32.8	5.45	17	+ 1.42	1.37	7	141.9

Breaking in and Laying out a Home Garden

SINCE the war many thousands of houses have been constructed throughout New Zealand. In most instances a new house means a garden to break in and lay out. New owners endeavouring to establish gardens are often faced with many problems: What to do first, how should fences be erected, how should certain noxious weeds be eliminated, how should a retaining wall be constructed, and a host of other questions. In the first part of this article C. L. Napier, Horticultural Instructor, Department of Agriculture, Hastings, suggests logical stages of garden establishment. The section of this article on garden work for June is by S. O. Gillard, Horticultural Instructor, Department of Agriculture, Auckland.



[*Green and Hahn*

BEFORE a gardener does any development on his new site he should make a survey of it and list in order of priority the items of work to be done. He should also decide what proportions of the area he is going to allow for vegetables, flowers, and lawn.

Where the section is sloping an immediate task may be the erecting of retaining walls for the construction of terraces. In some localities shelter is essential if gardens are to be established successfully. If hedges are to be put in, they will have to be planted early so that the garden is given some protection as soon as plants are set out.

Noxious Weeds

An important task that should be done before anything else is to rid the section of noxious weeds.

If noxious weeds are not eliminated before a garden is established, it is often very difficult to remove them later. Plants such as convolvulus, oxalis, and couch grass are difficult to eradicate, particularly when they are able to infest rock gardens, paths, and herbaceous and other perennial plants. Some noxious weeds are sometimes difficult to control, but all can be eliminated if the correct control method is persisted with.

Woody plants such as gorse, blackberry, and brier rose can be controlled by preparations of 2,4,5-T. Convolvulus is susceptible to 2,4-D preparations, but repeat applications are necessary. After the first application the runners of the plants should be allowed to grow before the next spraying is made. A non-volatile form of the hormone should be used (see the article "Weedkillers in the Home Garden" in the January 1953 "Journal").

Non-volatile forms do not give off vapours likely to damage neighbouring crops and are safer than volatile compounds for home garden use. For best results a calm, warm day should be chosen. The calmer the air is the less likelihood there is of spray particles being blown on to surrounding crops.

Couch grass can be eliminated simply by cultivation, but it may take several months. If the operation is begun early in summer, the grass should be virtually eliminated by autumn. For the home gardener forking is perhaps still the most satisfactory method.

Preparations of T.C.A. (trichloroacetic acid) can be used for couch destruction, but for best results with T.C.A. the area to be treated should be turned over with a rotary cultivator or plough. The upturned sods should then be sprayed with the T.C.A. This preparation is more effective when applied shortly before rain.

Couch may also be eradicated by a combination of cultivation and spraying. Cultivation can be carried out during summer, and in the late summer the remaining couch treated with T.C.A. as suggested. For home gardens T.C.A. at 1lb. to each 100 sq. ft. should suffice.

Oxalis is one of the most difficult plants to destroy, as the bulbs are able to remain viable for many months in and out of the soil. Borax, "Atlacide", and a powder form of the sodium salt of M.C.P. have all been used with partial success against oxalis. For effective results the first two materials should be used at at least ¾lb. to each square yard; M.C.P. dust should be applied at 2oz. to 4oz. per square yard.

"Atlacide" and borax treatments render the soil useless for about 6 months and the M.C.P. treatment for 3 months, but because not enough is known of the effect of borax on the soil, "Atlacide" or M.C.P. would be the safer to use.

Drainage

Before any permanent development takes place any necessary improvements to drainage should be carried out. It is much easier and quicker to install underground drains in vacant ground than on developed land. In some instances building up of the soil may give all the drainage required, as raising the soil surface has the same effect as lowering the water-table. A garden which is situated in a low or very flat locality may be difficult to drain if an efficient outlet cannot be obtained. No drain will operate effectively unless its outlet can run into a deeper drain which flows all the year round, particularly during the wettest periods of the year.

The lower illustration on page 493 shows two simple drainage systems that can be installed easily. Drains can consist of field tiles, broken bricks, stones, brush, or boards made in the form of an inverted V. A garden sloping all one way and which may be receiving seepage water from higher ground can often be drained effectively by one drain running along the highest side. This would apply in areas at the foot of hills or close to them.

Before an extensive drainage system is installed a close examination of the subsoil should be made, because this may reveal that drainage is impeded only by an impervious layer which can be broken up with a fork or other implement. At times this treatment will be all that is necessary.

Hedges and Fencing

Many new householders will have to erect some type of boundary fence within the first few months. The Fencing Act 1908 sets out the requirements, and one alternative is a fence

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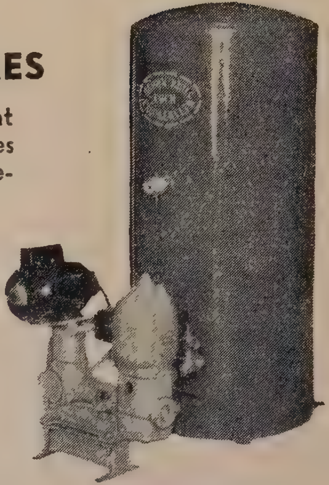

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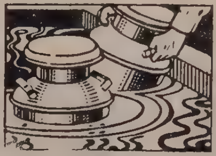

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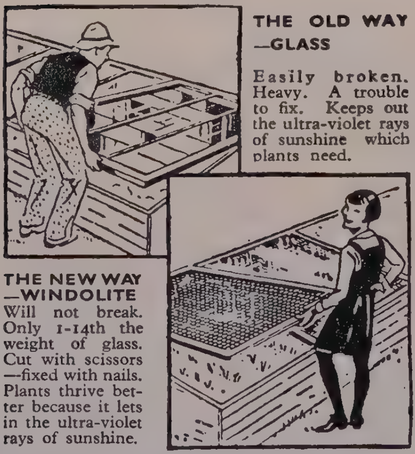

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of a type agreed on by adjoining owners. This usually covers the position satisfactorily.

Hedge planting in relation to existing fencelines is a question about which many gardeners are doubtful. The Fencing Act states that no person shall plant a live fence on or alongside a boundary fence without written consent of the occupier of the adjoining land. The words "on or alongside" do not indicate how close trees may be planted. Legal problems are more likely to be created when trees and not hedges are planted close to fencelines.

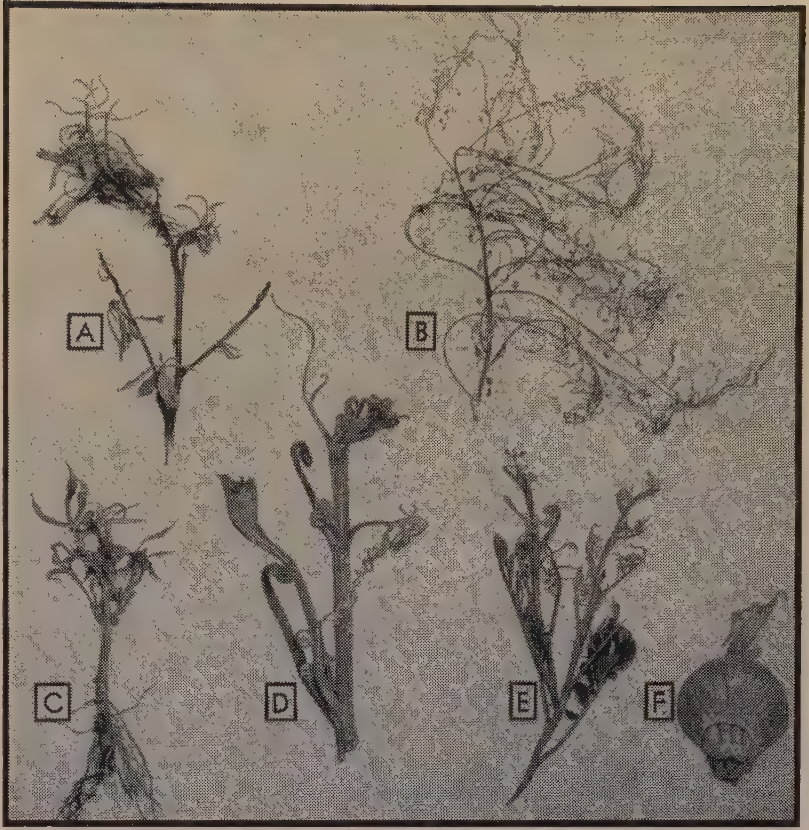
In some localities hedges are essential if successful gardens are to be established and living conditions are to be pleasant. The type and kind of hedge to plant depend on the height required, soil type, proximity to sea, possibility of frosts, and soil conditions likely to be experienced, such as very dry or very wet. A few of the hardier hedge plants and their approximate maximum heights when mature are:—

	Height ft.
Lonicera nitida	8-10
Escallonia spp.	15-20
Eleagnus	15
Buddleia spp.	15-20
Abelia floribunda	6-10
Golden ake ake	20

Most of these plants can be kept to any desired height by regular clipping.

Distance of Buildings from Fencelines

The positions of sheds and poultry houses are governed by by-laws, and householders should consult their local authority before proceeding with a building.



[R. W. Orr

Plants severely affected by spray drift of hormone weedkillers: A—Peach. B—Asparagus. C—Bean. D—Pumpkin. E—Potato. F—Onion.

Hillside Sections

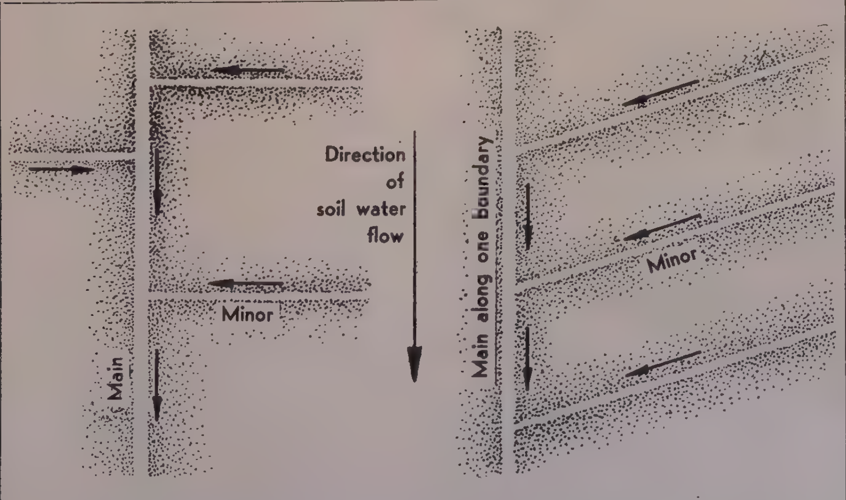
Hillside sections present special gardening problems, particularly when the slope is steep. On such sites terraces are necessary if satisfactory plots are to be constructed, but the layout can look very attractive.

Terracing can be a major job, but if the land is steep, retaining walls to be secure must be properly constructed. The grade of the slope will determine whether there will be a number of narrow terraces or a few wide ones. On land with a good grass turf gardeners sometimes use turves for constructing retaining walls. These make excellent temporary structures, but after a number of years tend to break down through continuous close cultivation.

Retaining walls can be constructed with timber, concrete, bricks, cemented rocks, or large rocks fitting snugly into each other without being bound with cement. Because of its cost today and lack of durability, timber is seldom likely to be used. Brickwork is durable, but there is no question that stone work looks more natural and pleasing.

All retaining walls should be built with a slope toward the back of 2in. in every foot in height. Thus a wall 4ft. high should slope toward the earth it is retaining 8in. from base to top. High retaining walls are often built in two tiers with the upper one at least 2ft. back from the first. This ensures rigid construction.

All retaining walls should rest on a firm foundation. To obtain this an excavation should be made along the line the wall is to take until a solid bed has been reached. Cemented walls of brick and stone can then be built easily on this. Where stones are used without cement binding great care is required in laying the stones correctly. Large foundation stones are laid first, with the widest side to the inside. The stones should not lie flat, but should incline toward the bank. The top surface of each stone is roughly at right angles to the front face of the wall. All succeeding stones should fit into or interlock with previous ones. All spaces should be well filled with soil mixed with stone particles. If filling and laying are thorough, it should not be possible to prise a stone out of the finished wall. A retaining wall thus constructed provides much space for rock or wall



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plants and adds to the pleasures of gardening.

Pathways

The positions of pathways are often difficult to decide. On sloping sections, particularly where terracing is necessary, paths may be best running up and down the slope. Whether they are best on one side or in the centre of the area will depend mainly on the width of the section. On gentle slopes the paths may run zig-zag or up and down. Though a zig-zag path is easier to traverse, it is often difficult to make it look attractive and it may waste valuable space.

Planning for Size and Crops

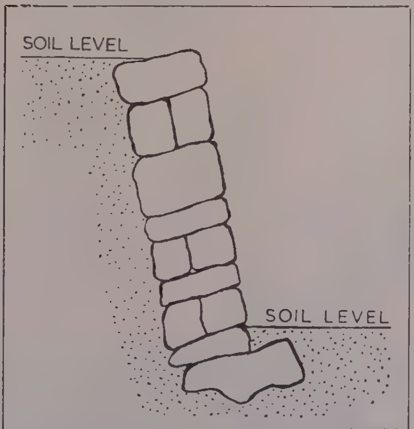
When establishing a house section the gardener should plan it very carefully, taking into consideration the size of his family, the area of garden, what portion is required for lawn, the locality and climate, and what vegetables he wishes to grow. Climate and size will be two of the main governing factors.

In some localities frost-tender subjects may be difficult to grow, and on small areas large plants may take up too much room. Where large families need to be supplied it may be more economical to raise staple vegetables such as root crops, cabbage, silver beet, and potatoes in preference to crops like spinach, peas, and beans which do not give very heavy crops from the same area of garden.

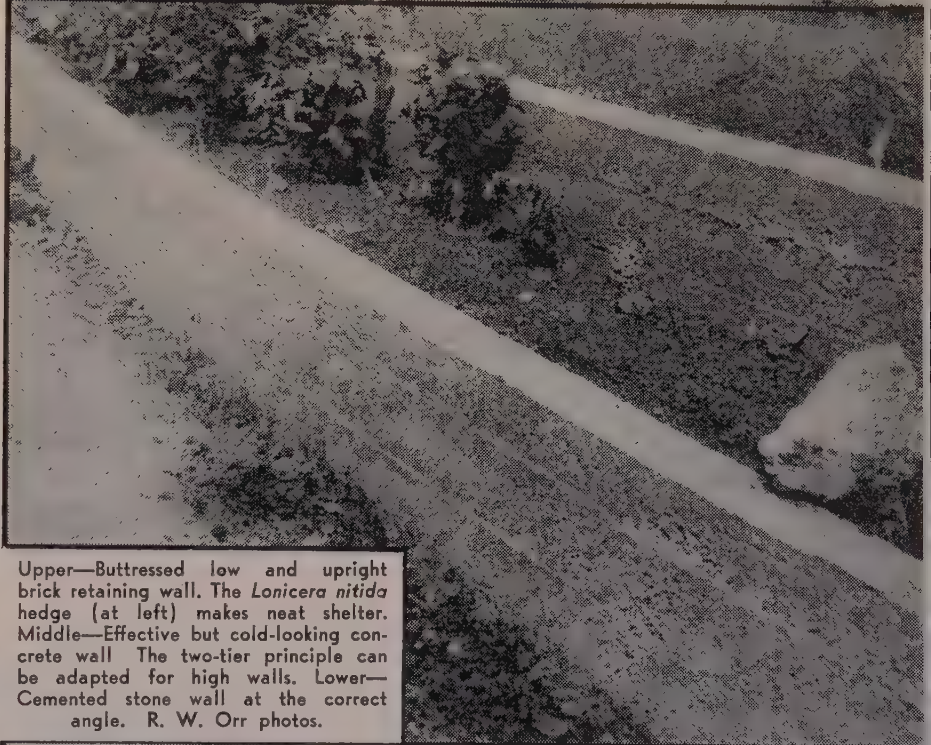
Most gardens are divided by paths, but this should not be overdone. Paths not surfaced are difficult to keep clean, and numerous paths can occupy a lot of ground which otherwise could be employed for crops. If short rows are desired, dividing the garden into long, narrow plots by paths running longitudinally will be more economical than having paths running off in various directions. Long rows are more economical than short ones and more satisfactory if a wheeled hoe is to be used for cultivation.

Continuity of Supply and Rotation

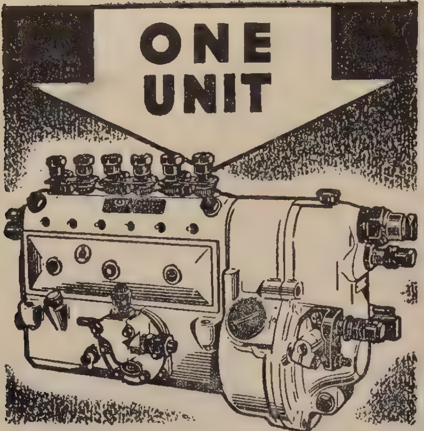
A garden is not producing to its maximum unless it is producing vegetables all the year. Many gardens are full in summer and empty in winter, when vegetables are often scarce and



The base of a rock retaining wall should rest on a solid foundation. Rocks should fit snugly together and should be tilted back toward the rear of the wall.



Upper—Buttressed low and upright brick retaining wall. The *Lonicera nitida* hedge (at left) makes neat shelter. Middle—Effective but cold-looking concrete wall The two-tier principle can be adapted for high walls. Lower—Cemented stone wall at the correct angle. R. W. Orr photos.



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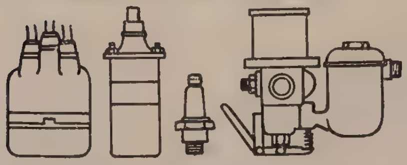

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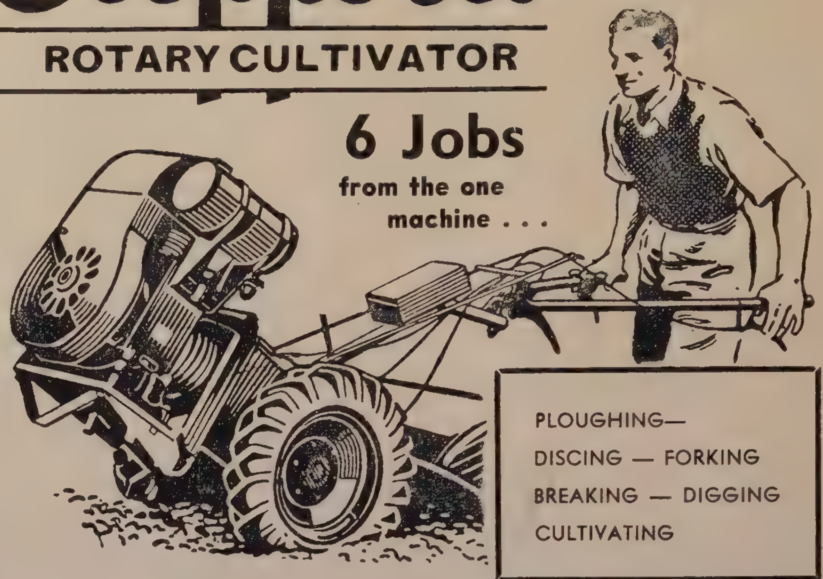

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expensive. Rotation of crops is a convenient way of utilising the area available for most of the year. A plan showing how rotation can be carried out on an area 30ft. x 20ft. was given on page 135 of the February 1953 issue of the "Journal".

In estimating requirements for the year the following approximate yields per 100ft. of row may be used as a guide:—

	lb.		lb.
Beans (broad)	120-200	Onions	100-150
Beans (other)	60-80	Parsnips	160-200
Beetroot	70-100	Potatoes	150-200
Cabbages	150-200	Pumpkins	100-200 fruits
Carrots	75-100	Silver beet	80-150
Leeks	150-200 plants	Swedes	180-200
Lettuces	100-130 heads	Tomatoes	150-200
Marrows	100-200 fruits	Turnips	75-100

After all the initial planning of the garden has been done clearing of all overgrowth can be carried out. All vegetation that is not noxious should be dug in or composted. Woody material and perennial weeds such as docks are best burnt. It is a good plan to dig in as much of the weed growth as possible and to compost the surplus. Incorporation of the vegetation will help to improve soil texture and also add small quantities of plant foods.

In any home garden a compost bin or heap is essential if nothing is to be wasted. Often there is too much plant growth for digging in conveniently. This often happens during autumn, when residues of crops and tops of herbaceous flowering plants are removed from the garden. The compost bin or heap should be in an easily accessible corner, but not in a position where it makes the garden look untidy.

Initial Digging

In new sections ordinary digging may be all that is required before the first crops are set out. In clean sections having good access a great deal of hard initial work may be saved by getting a contractor to give the area a light cut with a rotary cultivator. If desired, a second cut can be given later or the area can be hand dug.

However, on new areas it is often advisable to double dig or trench the soil.

Double digging is begun like ordinary digging, but as each trench is opened up the second, deeper spit is turned over with a fork. This has the effect of opening or loosening the subsoil, and where the subsoil is heavy and perhaps only semi-pervious it can improve drainage and root run for plants.

Trenching consists first of digging a trench two spits deep. The top spit from the second trench is then turned into the bottom of the first trench. The bottom spit from the second trench is then brought to the top of the first trench. This method is satisfactory only where the topsoil is nearly two spits or more deep. The advantages are similar to those of double digging. In addition the deeper trench allows much rubbish from a new section to be buried quickly. All rubbish buried should be chopped up and mixed with the soil as much as possible.

Sometimes trenching may bring up subsoil, but unless a considerable quantity is brought up, this is not a disadvantage. Thick layers of organic matter should never be buried when ground is being dug, because if this is done the bacteria which normally break down organic matter, and which rely on oxygen, cannot reach the interior of the buried material.

Green Cropping

Sometimes a gardener does not wish to break in a section immediately. It is then a good plan to give it a shallow cut with a rotary cultivator and sow a green crop, as this will discourage weeds and provide valuable organic matter for turning in later.

Oats, barley, lupins, mustard, and peas all give good results. For late summer and autumn crops oats, barley, or mustard are more satisfactory, as lupins and peas do not thrive at this time of year. When the cover crop is turned in a further opportunity should be taken to eliminate perennial weeds such as couch, docks, and thistles.

First Crops

If what to plant has been planned ahead, there should be no difficulty in deciding what to plant first. In weedy sections it is often desirable to plant the whole garden in one crop, usually potatoes, for the first season. This assists in cleaning the soil and breaking it up, thus making future cultivation much easier.

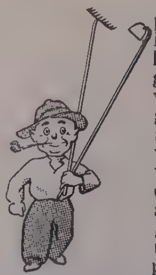
The layout of the vegetable crops should be orderly. Herbs and perennial crops, such as rhubarb and asparagus, should be in plots of their own. Where possible tall crops should be on the south side of the garden so that the shorter ones receive as much sunshine as possible. In larger gardens tall crops, such as sweet corn, can often be used at intervals to act as shelter.

A garden should be planned thoroughly before it is laid out, because once permanent improvements are made, it is difficult to change them. Though there is more satisfaction in completing quickly the many tasks connected with breaking in a new garden area, doing them more slowly will often give a more pleasing effect and also a more permanent arrangement.

[*R. W. Orr*

Turning over the subsoil as in double digging.

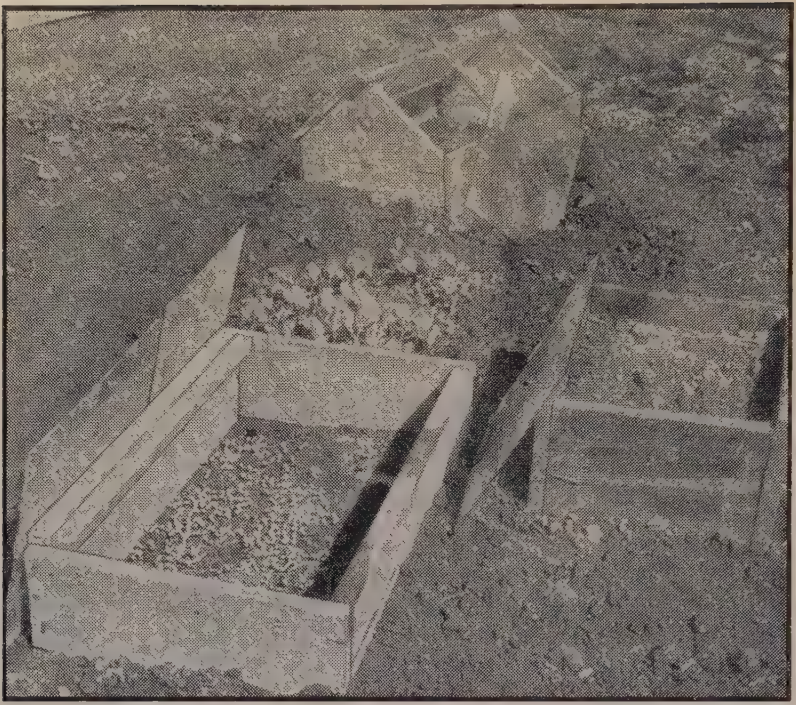
Work for June



Though crops already planted will still be making progress, growth will have slowed up and the ground will be losing the warmth necessary for germinating seeds. Only a few hardy kinds of vegetables can be sown with success in the open, even in the more favourable localities, until the ground begins to warm up again. The growth of plants depends to a large extent on the growing conditions for their roots. Poorly aerated and waterlogged soils soon inhibit root growth and activity. That is why plants in open-textured soils grow better, particularly in winter, than those in closely compacted soils. Cultivation is of great assistance in aerating soils and reducing the moisture content when it is too high. Soils which are inclined to consolidate after heavy rains require more frequent cultivation than do lighter soils.

Hoeing should be frequent enough to suppress weeds which, if left to grow, rob the plants of food and provide hosts for insect pests and diseases. All cultivation close to the plants should be shallow or damage may be done to their roots, but between the rows the soil may be loosened up with a fork or drawn up to large plants, such as cauliflower, cabbage, and brussels sprouts, to help support them. Moulding up the soil to form ridges also helps soil drainage and is an excellent winter practice.

Lime may be spread on unoccupied ground to be washed into the soil by winter rains. Most kinds of vegetables benefit from annual applications of lime to average garden soils at up to ½oz. per square yard. Experience has shown that the slowly available carbonate (agricultural lime) is the best form to use for the growing of vegetables. Where green crops or animal manures are freely used for soil improvement, the use of lime is especially needed to stimulate bacterial



[*Sparrow*

Frames for raising cabbage, cauliflower, and lettuce plants in winter. On fine days the glass should be removed for a few hours during the day to keep the plants from becoming drawn and weak.

activity and to hasten decomposition of the plant material.

Winter is the most suitable time to apply lime, as a larger part of the area will be unoccupied than at other seasons. Agricultural lime will not harm growing plants, but it is not advisable to let burnt lime come into contact with tender foliage.

Sowing

Soils in most districts will be cold and little advantage is gained by sowing seed in the open at this time. In the few favoured localities where soil is in suitable condition the following may be sown:—

Broad beans are a popular vegetable which often proves a disappointment to the home gardener. Late planting is often one of the reasons for failure, but if a sowing has not been made already, it is not too late to plant the seed now. Dwarf varieties are preferable for gardens exposed to frequent winds. No extra manure is required where the ground was heavily fertilised for a previous crop, but for poor soils blood and bone sown along the rows 2in. beneath the seeds at the rate of 1oz. per foot of row will suffice. Recommended varieties are Coles Dwarf (dwarf), and Broad Windsor and Long Pod (tall varieties).

[*Sparrow*

Now is the time to select potatoes for next season's crop. The tubers should be placed rose end up to sprout and should be stored in a light, airy, frost-free shed.

Peas: In cold districts it is better to delay the sowing of peas until the end of July at least; elsewhere small sowings of early varieties may be made toward the end of June. Seed should be sown in ridges in the warmest and best-drained part of the garden. In fertile soil no fertiliser is required for this crop. Where fertiliser is considered necessary it should be mixed into the soil thoroughly or placed well below the seed. Birds are particularly destructive on gardens in winter, but the peas can be protected by strands of black cotton stretched along the rows about 2in. above the ground. Another method is to cover the rows with strips of fine mesh wire netting bent into arches and pegged down with wire hooks.

Recommended varieties to sow now are William Massey and Little Marvel.

Cabbage and cauliflower: In the warmer parts of the North Island cabbage and cauliflower seed may be sown this month to produce plants for setting out in August. Ground in a sunny position should be prepared and a shallow, bottomless box placed firmly on the bed. The seed should be sown thinly within the box and covered lightly with a mixture of finely sifted compost and sharp sand. After the bed has been lightly watered a sheet of glass should be placed over the box. The glass should be removed for a few hours during fine days as soon as the seedlings appear or the plants will become drawn and spindly. Good varieties are:—

Cabbage: Enfield Market, Golden Acre, and Flower of Spring.

Cauliflower: Early London and Snowball.

Lettuce: Seed may be sown under glass as for cabbage. Recommended winter varieties are Neapolitan (winter strain), Imperial 615, and Triumph.

Radish: If a warm part of the garden is selected, radish seed will germinate quite well in most localities even though the soil temperature is comparatively low. The plants grow quickly, good sized radishes being produced in 30 to 40 days. Because radishes deteriorate very soon after reaching maturity, it is better to make a succession of small sowings than to plant a large quantity at one time. Recommended varieties are French Breakfast and White Icicle.

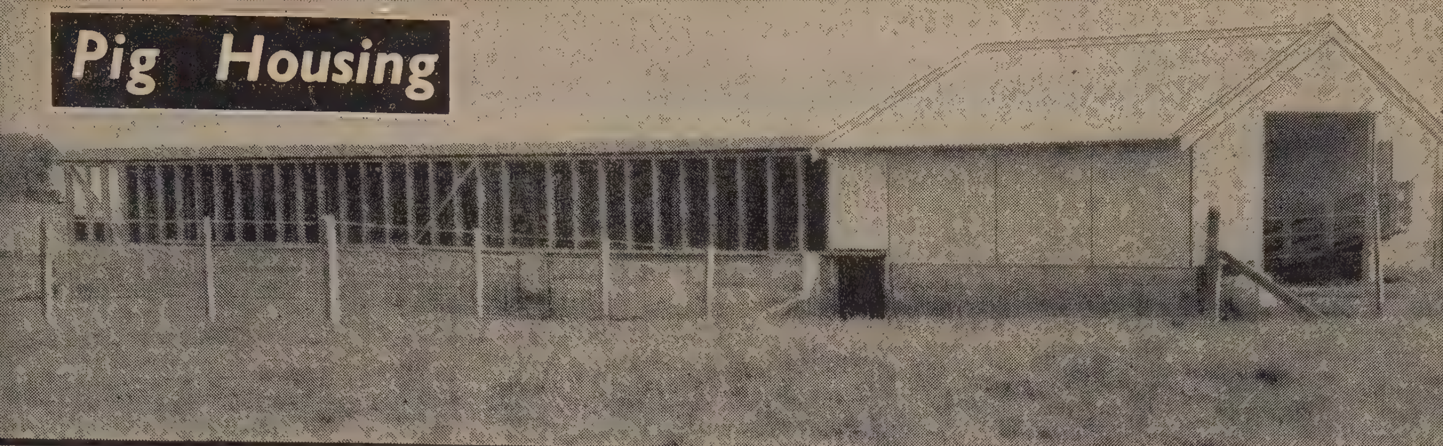
Plantings

Cauliflower for harvesting in early summer may still be planted in the warmer districts of the North Island. At this time of the year the plants should be set in ridges 6in. high and 6in. wide at the top. Rows should be 30in. apart with plants 18in. to 24in. apart in the rows. A fertiliser consisting of 2 parts of blood and bone and 1 part of superphosphate should be placed beneath the ridges at 2oz. to each 1ft. of row. Cauliflowers require plenty of plant food, and so that they will grow without a check a side dressing of 2 parts of sulphate of ammonia and 1 part of superphosphate should be applied just before the curd begins to form. About a dessertspoon of the mixture should be spread round each plant. Suitable varieties to plant now are Phenomenal Early and Walcheren.

Cabbage plants may be set out in the warmer parts of the North Island in the same manner as described for cauliflowers, except that spacings between plants can be reduced to 12in. to 15in. No side dressing of fertiliser should be necessary. Recommended varieties for planting now are Hendersons Succession and Jersey Wakefield.

Herbs: June is a good month to plant herbs. Those most in demand are sage, mint, thyme, and parsley. The first three establish best from rooted subdivisions from established plants. Parsley is best grown from seed sown in September or March.

Pig Housing



HEADING PHOTOGRAPH: Whey piggery. The whey tank is in the shed, which also acts as a truck shed and covers weighing yards. Whey is piped along the front of the house.

Housing for Whey Feeding Piggeries

THE problems inherent in the use of a bulky liquid food such as whey and in particular the influence of the type of food on housing design are discussed in this article, the fourth of a series dealing with pig housing. Examples of some of the designs in use on successful whey-feeding piggeries with an appraisal of their merits and weaknesses are given by A. Longwill, Superintendent, Pig Industry, Department of Agriculture, Wellington.

THE principles underlying the design of modern pig housing units having definite areas for feeding, sleeping, and dunging have been evolved in countries where grain feeding is the rule. Drainage is from the first two to the third of the specialised areas and, under proper management, cleaning is simplified, because it involves merely sweeping and washing out the dunging race. The rest of the floor is kept clean and dry by the pigs and requires the minimum of attention.

At the present stage of development of the industry in New Zealand the feeding system typical on dairy farms involves the consumption of up to 6 gallons of skimmed milk or 8 or 9 gallons of whey per day for a baconer pig. Even with the use of skimmed milk the quantity of liquid fed is such that the feeding area is soiled and must be regularly cleaned as well as the dunging area. With whey feeding the tendency for pigs to urinate on the feeding area is even more pronounced.

Under these circumstances the dunging race design is not achieving the purpose for which it is intended. Since the feeding area must be cleaned out daily, it appears to be unnecessary to go to the trouble of adding a dunging area, which may only be adding to the cost and work of cleaning the house.

From Free Range to Control

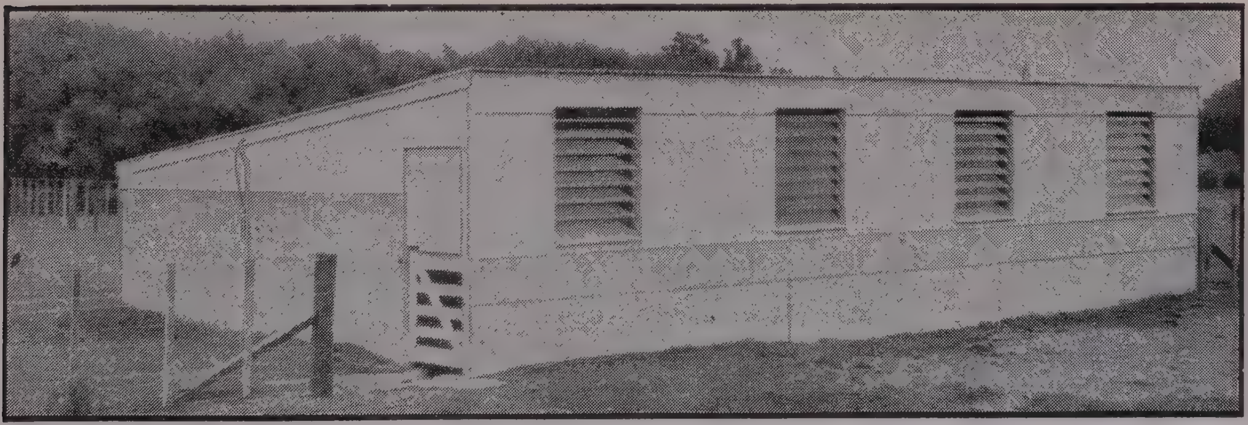
Until recent years the usual approach to the problem has been to permit whey-fed pigs to have free range on grass with small houses for shelter, but without attempting any close control over the pigs. Whey has been offered ad lib. in troughs, sometimes controlled by ballcocks. On whey supplemented by a small amount of meal the pigs have kept healthy in the main, but have taken upward of 8 months to reach baconer weight.

The stage has not yet been reached when meal supplementing at levels which would approach the ideal in efficient food conversion can be carried out economically. However, there is a growing appreciation of the influence of controlled housing on efficient use of food, and many houses are being built in which the pigs are kept with controlled run-out on grass. It is in the design of such houses that the merits of a dunging race are questioned. Degree of roofing-over and falls on floors are also lively topics of debate.

Taranaki Piggeries

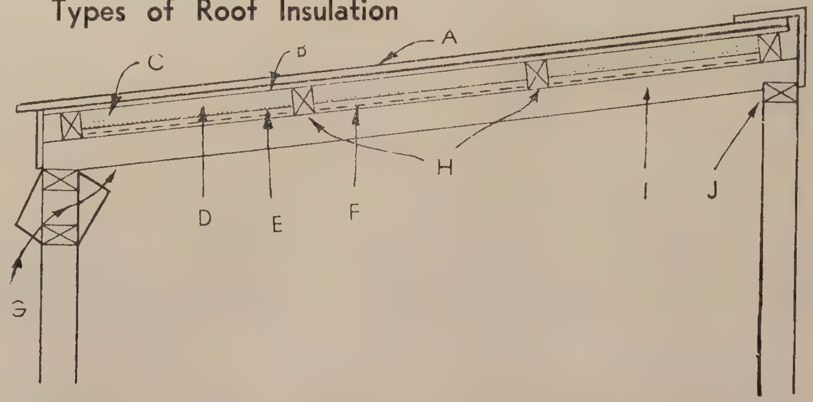
The intensive cheese-producing province of Taranaki offers many examples in the piggeries being erected today of the preference of farmers for a simple, forward-drainage design dispensing with any special dunging area.

The 8ft. x 8ft. sleeping quarters occupy the back of each unit, with a feeding area 8ft. x 10ft. in front. The trough runs up the side of the feeding area; usually the troughs of adjacent pens are placed on either side of the dividing wall to make one feeding point, drainage being away from the trough and sleeping quarters to a gate on to the feeding race at the lower front corner of the feeding area. Units are paired in this way so that when, as is usual, the whey is piped along the

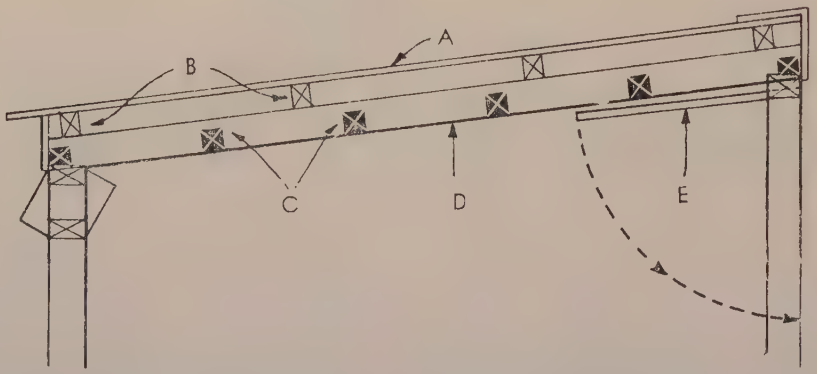


Well-built covered type of house. Ventilation control is provided by louvres built into the front wall.

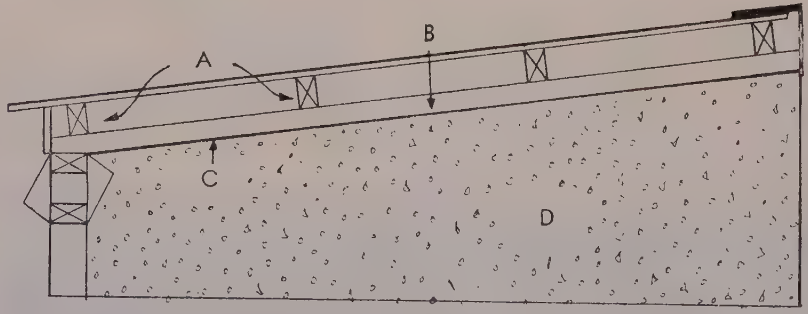
Types of Roof Insulation



Multilayer of materials and air space. A—Corrugated asbestos cement sheet. B—Building paper. C—Air space. D—1in. of perlite. E—Aluminium foil. F—Wire netting. G—Ventilator. H—3in. x 2in. purlins. I—4in. x 2in. rafter. J—4in. x 2in. top plate.



Simpler and less costly form than that above. A—Corrugated asbestos sheet. B—Purlins; could be replaced by sarking. C—Dwangs (at 18in. centres) between rafters to support ceiling. D—Insulating board. E—Shutter.



Another simple form. A—Rafters across roof from side wall to side wall. B—Hardboard ceiling. C—4in. x 2in. top plate. D—Concrete side wall.

feeding race one feeding point serves a pair of pens.

Falls on Floors

The falls in each unit are compound falls from back to front and from trough side to the opposite side of the pen, giving an over-all fall of approximately ¼in. to 1ft. Successive units are laid out with the same fall as that required in the drainage channel outside the pens. Provided these are truly laid, a fall of as little as 1 in 250 is sufficient here; 6in. glazed channels have been used successfully as the main drain in the feeding race. They have the advantage of taking up less space than the broad, flat type of concrete drain usually recommended. If cleaning out is done with a pressure hose, dung will be readily sluiced out along these channels.

Extent of Roof

Many of the houses being built are roofed completely over, including the feeding race. Unless the front is capable of being completely closed and fairly expensive insulation and ventilation control are included in the design, such houses tend to be too cold for pigs, particularly smaller pigs during winter. A house of the fully enclosed type which is satisfactory is shown in the lower illustration on page 499.

Less material and labour cost are involved if the sleeping quarters only are roofed over and, provided attention is given to the insulation and ventilation of the sleeping quarters, this cheaper design is quite satisfactory. The front of the sleeping quarters should be capable of being closed completely with the exception of a 30in. x 20in. entrance. The roof should be well-insulated and means of controlled ventilation should be provided.

The drawbacks to the cheaper type of house are: First, in wet, cold weather the pigs are reluctant to leave their sleeping quarters and in coming out to feed get wet. This moisture, taken back into the sleeping quarters, tends to make them moist and the atmosphere humid. However, as long as the sleeping quarters are warm the pigs will soon dry and be comfortable. Secondly, as the feeding race is uncovered, there is no protection against weather for the man tending the pigs. The farmer usually wears an oilskin when going to the piggery in bad weather and, provided the layout is such that he can feed pigs quickly, the lack of cover over the feeding race is not a very serious practical disadvantage.

Insulation

As has been stressed in dealing with designs in earlier articles in this series the two most important factors in building for the comfort of the pigs are good insulation to prevent heat losses, particularly through the roof, and, secondly, control over ventilation to some extent at least.

For highly efficient roof insulation a multilayer of materials with good insulating properties incorporating an air space as shown in the upper diagram on this page may be chosen. This, of course, is rather costly, but if it is restricted to the sleeping quarters only, it could be built much more cheaply than the complete roof with any reasonably satisfactory insulation.

Corrugated asbestos cement sheets are the first choice for outer sheathing where insulation is important. In warm districts a coat of light coloured cement paint will assist in reduction of heat absorption from the sun's rays. A layer of building paper or felt under the sheathing will give a more stable air space underneath. The lower layers of blanketing below the air space comprise a 1in. layer of perlite (an expanded mineral insulating material) laid loose over a layer of paper-backed aluminium foil supported by wire netting stretched over the rafters before the purlins are put on.

The aluminium foil laid with bright side down reflects heat rays and the little heat which penetrates will be held by the subsequent layers. This roof will give almost perfect insulation. Not only will it prevent loss of heat when outside temperatures are much below the optimum which it is desired to maintain inside, but it will completely resist penetration of heat from the sun in hot weather.

Under the latter conditions, however, air temperature may rise to the extent that, despite insulation and good ventilation, fattening pigs and breeding stock become distressed. Under these circumstances the best solution is to allow a spray or trickle of water to run over the feeding yard. The evaporation of this water lowers the temperature of the air in the house to a marked extent, restoring comfort to the pigs, which will spread out over the sleeping quarters.

Simpler and less costly forms of roof insulation are shown in the middle and lower diagrams on the opposite page. Some layers of the complete insulating blanket shown in the upper diagram on the opposite page can be replaced by other materials or some even eliminated, making construction easier and cheaper, but slightly reducing insulating capacity.

Though the roof is the most important site of heat losses, it is not the only one, and the insulating properties of the floor and walls must be given some consideration. A good fill of large rubble or other hard fill under the floors will form a damp course base for concrete floors. It will probably be worth while putting the sleeping floor in with an aggregate such as coke breeze, pumice, or sawdust, which have good insulating properties, and topping with a ⅜in. layer of plaster or bitumin. The finishing level of the sleeping floor should be an inch or so above the level of the feeding area where they meet.

The aggregate used in the feeding floor should be a good one. The floor should be finished with a strong plaster sealed with a silicate sealer and painted with a bituminous emulsion paint (to reduce wear on the pigs' feet until the surface has weathered) or coated with ⅜in. of pure Trinidad bitumin applied hot with a squeegee in three successive layers ⅛in. thick. The latter method has been found to give a satisfactory floor where foot-rot is prevalent as an outcome of wear on pigs' hoofs on new concrete floors. Bitumin must be applied to a clean floor, and if a priming coat of bituminous paint has been applied first, it will provide a better bond and counter any tendency for the pure bitumin to lift.

Walls of hollow concrete blocks laid with a damp course over a solid concrete foundation will provide better insulation than boxed concrete. The advantage in practice is not so marked as in the insulation of roof and floor, and if it is found cheaper or simpler to use boxed concrete construction, this will be satisfactory.

Ventilation

Only in the completely enclosed house can full control of ventilation be obtained. It has been found that 6 sq. in. inlet and 10 sq. in. outlet per pig accommodated in such a house provide all the ventilation required. The type of inlet recommended is one (as shown in the diagram below) high up in the rear wall which directs the incoming air toward the centre of the ceiling, from where it falls to displace the warmed air in the lower part of the house. An outlet at the highest part of the house allows the used air to escape.

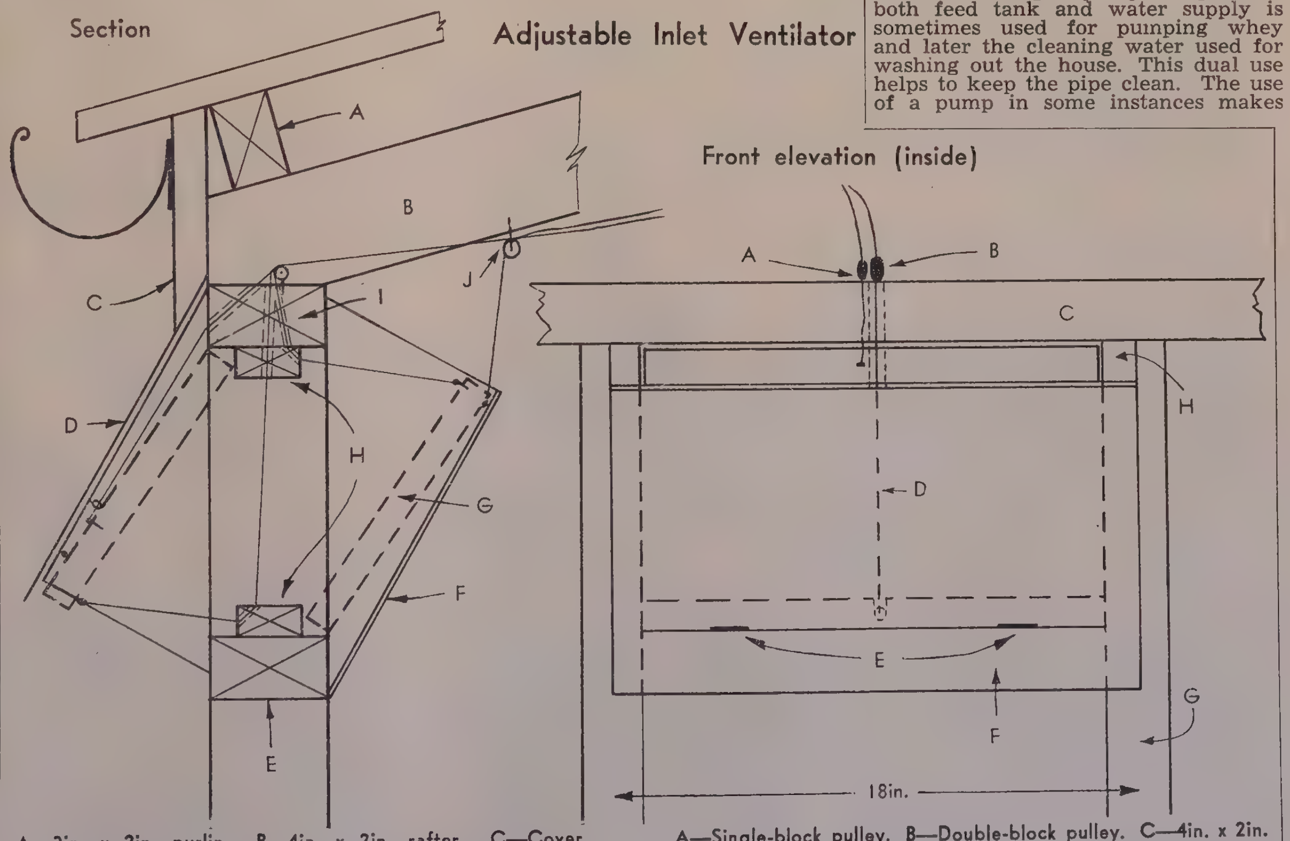
In a house roofed over the sleeping area only, the entrance always being open allows more air exchange than is desirable in cold weather, and during such periods the inlet must be kept closed. Details of the type of ventilator recommended show how it can be adjusted and closed completely when desired (see below).

Other Suitable Plans

The forward-draining plan already described is not the only type suitable for the whey feeder. Where the situation favours the reverse slope or side drainage, one of the types of general-purpose house dealt with in last months' article would be appropriate. Houses designed more specifically for fattening will be dealt with next month.

Reticulated Feeding

The bulky nature of whey makes it very desirable to include in the design of the piggery reticulation of the feed to all pens. A 2in. plastic pipe is now available and is easily kept clean. A small centrifugal pump coupled to both feed tank and water supply is sometimes used for pumping whey and later the cleaning water used for washing out the house. This dual use helps to keep the pipe clean. The use of a pump in some instances makes



Adjustable Inlet Ventilator

Section

A—3in. x 2in. purlin. B—4in. x 2in. rafter. C—Cover board cut from 8in. x 1in. timber. D—Flat galvanised iron sheathing over board. E—4in. x 2in. false plate between studs or on top of 4in. concrete wall. F—Plywood or hardwood cover. G—9in. x 1in. ventilator board. H—2in. x 1in. stop. I—4in. x 2in. top plate. J—Pulley cords for control of ventilator.

Front elevation (inside)

A—Single-block pulley. B—Double-block pulley. C—4in. x 2in. top plate. D—Cord to close outer ventilator board. E—Hinges. F—False plate (covered over). G—4in. x 2in. stud. H—End board (cut from 6in. x 1in. timber).

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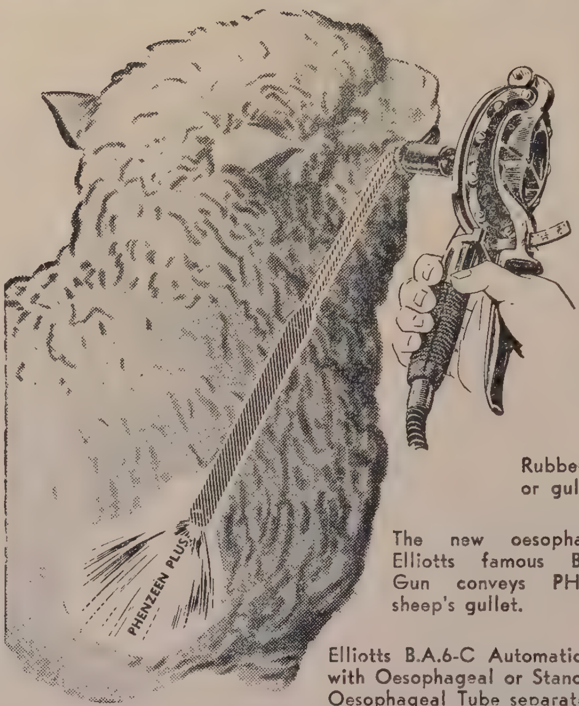

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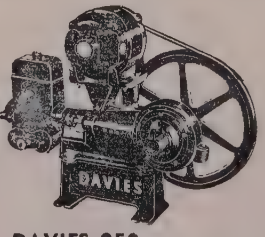

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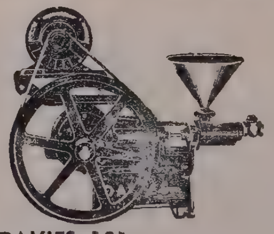

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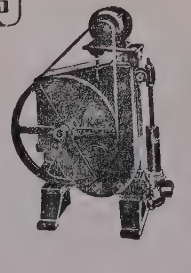

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the building of a tank stand unnecessary.

Quick-acting cocks at each feed point are needed to enable the feeding to be carried out expeditiously. These are usually rather costly, but there seems to be no reason why a simple quarter-turn plug cock, a larger version of the type used on milk vats, should not serve the purpose very well, provided it is placed out of the reach of the pigs.

Meal House

Meal supplementing is essential to efficient use of whey, particularly for breeding sows and young pigs. A meal house with convenient bins for meat meal and grain meals should be situated centrally in the layout. The bottoms of the bins should be raised a foot or so above ground level so that stooping to get the last of the meal out of the bins is reduced.

General Layout

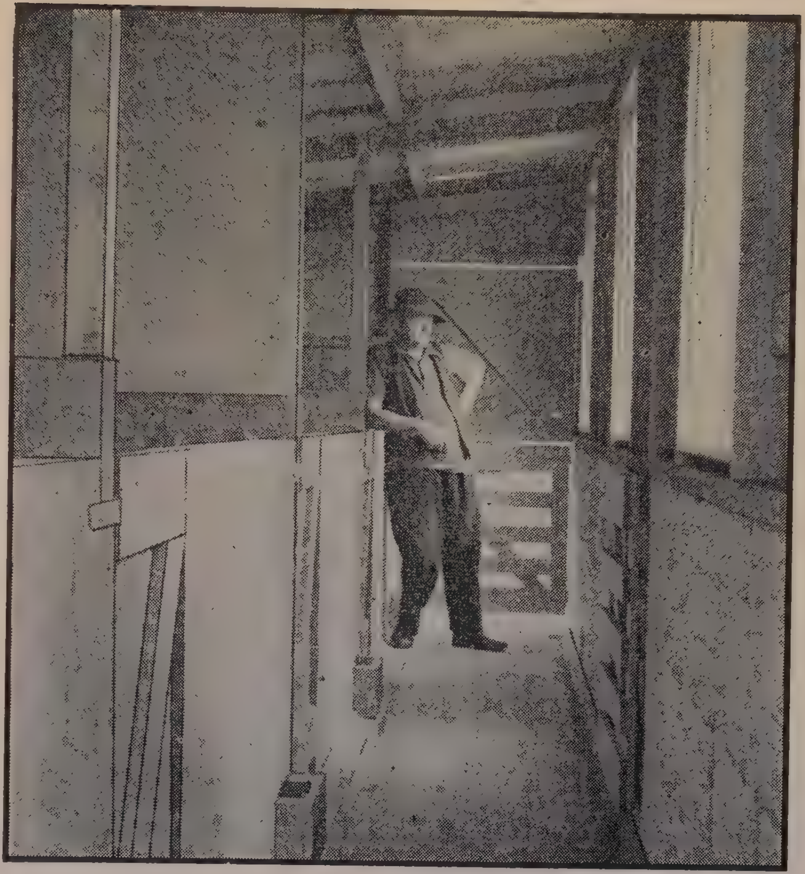
The need to keep to a minimum the length of feed pipe or the distance whey has to be carried makes it desirable to concentrate the layout round the feed point. The double-range type of layout with central feeding passage may be suitable where cost is not a serious obstacle, but from what has been said earlier about the roofed-over type of house with whey feeding it will be clear that the house with open feeding yard will be preferred. This type is not suited to the double-range, central-race layout, as one range of houses would be facing in an unsuitable direction.

In some cases an L-shaped layout with one wing on the northerly axis and the other on the easterly (that is, facing east and north respectively) with run-out behind the houses, may be suitable. In others where the whey is reticulated, multi-unit houses may be placed one behind the other and run-outs provided either to the sides or behind one house and in front of the next. If the fan, or completely centralised, type of layout is suited to the site, it may be preferred to any of the above, but where the whey is piped to the troughs the saving in time and labour will not be so marked for this type of layout as where bucket feeding is practised.

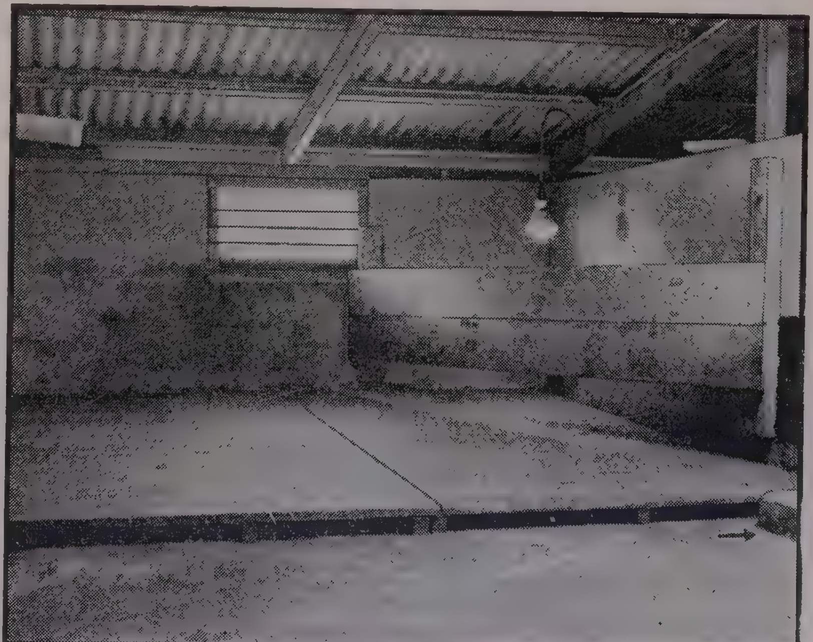
Conclusion.

Whey is a very valuable pig food and one which, when fed with discretion and understanding of its limitations, can give excellent results in growth and health of the pigs and quality of carcasses. Unfortunately there is still considerable wastage of this valuable food and good opportunities exist for the suppliers of cheese factories who are prepared to invest money in good pig accommodation to secure a good return on the investment.

Good housing, well laid out to minimise labour, makes the task of pig keeping pleasant. There is an aspect here which should not be lost sight of when a son is considering leaving the farm for work in the city which offers better prospects. Pigs can play a most important part in intensifying production so that such lads can remain on farms to become farm owners.



Above—View along the feeding race of the house illustrated at the bottom of page 499, showing how troughs project through the front wall of each pen with drainage channelled clear of the troughs. Below—Interior of one unit in a large, enclosed, double-range house. At the extreme right (arrow) is the end of the feed trough, and there is a brooder partition with brooder lamp.



Planting and Pruning Shrubs in Flower Garden

Above—Formal use of Italian cypress. Below—Italian cypress trained to an unnatural tiered shape.

THE planting of ornamental shrubs deters nobody, but pruning is a gardening operation often approached with diffidence and in some cases entirely neglected. Care at planting time and attention to pruning during the life of the plant are equally important. In this article M. J. Lockie, Horticultural Instructor, Department of Agriculture, Auckland, discusses these two aspects of gardening. Flower garden work for June is dealt with by B. F. A. Rough, formerly Horticultural Instructor, Department of Agriculture, Wellington.

PLANTING and pruning may not be closely related garden operations, but they are complementary in their contributions toward the successful growing of shrubs and trees. The ill effects of careless planting cannot always be rectified by subsequent training, but judicious pruning at and from the time a shrub is correctly planted will help to form a symmetrical framework and will encourage the types of wood which bear the most effective displays of foliage, flowers, or berries.

PLANTING

The shrub planting season is from March to September, with variations according to kind of plant and climatic conditions.

Most deciduous plants and the hardier evergreens are usually planted in June, July, or August, but, if winter conditions are very cold or very wet, it is best to delay planting until toward the end of that period. Severe frosts after planting may lift and loosen the soil and necessitate firming the earth again around the roots.

Sub-tropical plants, most evergreens, and fleshy-rooted trees such as magnolias and liriodendrons should not be planted in mid-winter, except in very warm, well-drained situations. In most districts where such plants thrive it is best to delay planting until late August or September, when growth is about to begin.

Evergreen and sub-tropical plants to be set out in localities where there is no likelihood of damaging frosts may be planted in March or April, giving them time to become firmly established before winter and to be in a position to begin growth without the check of planting out in spring. This practice is advisable only in those localities which experience mild winter weather. If there is doubt, it is best to delay planting until August or September.

Orders for shrubs should be placed early (1) to avoid the disappointment of a line being sold out, and (2) to gain the advantage of the better plants which go all too quickly. With the order, it should be stated whether or not an alternative is required in the event of a shrub being unavailable. This saves the nurseryman unnecessary delay in making up the order and avoids the collection of unwanted shrubs in the garden.

When the shrubs arrive the bundle should be opened immediately and the roots examined. If they have dried out in transit, as they may do after coming a long distance, they should be soaked in water before they are planted or heeled in. Potted plants or those with a ball of sacking on them should be soaked in a container complete with pot or sacking.

If planting cannot be carried out immediately, the plants should be heeled in in a sheltered position. To do this a trench of sufficient depth to take all the roots is opened up. The plants are then laid at an angle against the sloping side of the trench so that quite a portion of their trunks will be covered when the earth is replaced. The soil should be firmly packed about the roots and watered if necessary so that there is no chance of them drying out. The less delay there is before they are planted to permanent positions the better, but shrubs can be held in this manner for several weeks if necessary.

It is essential not to let the roots dry out now or at any time during planting.

Thorough preparation of the soil before planting is essential. Shrubs are permanent features of the garden and as such deserve every attention to help them to become established.

Digging over and preparing the whole bed or border are preferable to opening up individual holes for shrubs, but that is seldom practicable except in new gardens. In old beds or lawns, especially if the subsoil is of a heavy clay type, it is inadvisable to dig deep planting holes unless they can be drained. The loosened soil replaced in the hole becomes a drainage sump for water from surrounding ground. On sloping ground a trench can be dug from the lower side of the hole and filled with loose soil to serve as a drain. If that is not practicable, it is better to dig a wide rather than a deep hole for a shrub which will then be less likely to send down roots to a level where they may be injured by excessive soil moisture.

All fertiliser, compost, or farmyard manure should be kept well away from the plant's roots. If any of these materials are placed beneath a shrub, they should be at the bottom of the planting hole and covered by at least 1in. of soil as a buffer to avoid the injury likely to be caused by direct contact with roots. If the fertility of the soil in the area to be planted needs improving, soil from a richer part of the garden may be used at the base of the hole and for filling, or manures may be worked into the bed some weeks before planting. There will then be no risk of root injury. Bonedust is normally the only fertiliser which needs to be used when planting shrubs. It can be used at 2oz. per shrub.

The prepared hole should be large enough to hold the roots outspread without cramping them. Soil at the bottom of the hole should be loosened and soil for filling should be friable.

Planting Depth

Shrubs are planted to the same depth as they were in the nursery; it is usually possible to see the old soil mark and use it as a guide. Any broken or damaged roots should be trimmed off with a sharp knife or secateurs. If this is not done, such injuries will be slow to heal, and remain a point of entry for disease organisms. When the shrub is set in the hole it is essential to see that roots are spread out and neither twisted round each other nor bent round to fit a hole which is too small. Where a number of shrubs are being planted those not receiving attention should be covered with a damp sack to prevent the roots from drying out.

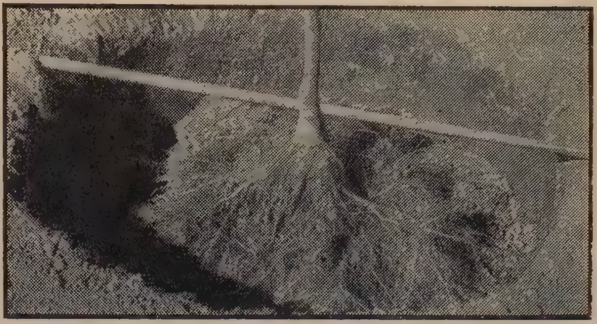
Evergreen plants and those packed with their roots in a ball of earth wrapped in sacking should be handled by that ball and not by the top growth. The weight of the soil is in many cases sufficient to pull the root from the top. When the planting hole is prepared and the balled plant is beside it the sacking should be removed and the roots with the ball of earth intact transferred to position in the hole. If, however, roots have been bent or wrapped around the ball they must be straightened. With pot-grown plants, they should be removed from the pot, even if it is of cardboard, the crock from the base removed, any spiralling roots straightened, and all fibrous roots teased out so that they can grow out easily into the surrounding soil and not remain clustered in a tight ball beneath the plant.

Firming of Soil

As the soil is replaced over the roots in the planting hole and each spade of earth goes back it should be well worked in to ensure that no pockets of air are left beneath or surrounding the roots. Thorough firming of the soil after planting is necessary. Very wet soil does not need to be firmed as much as dry soil. A slight mound of soil left at the base of the trunk will ensure that as rain and weather consolidate the loosened soil a depression is not formed round the trunk. Where the soil dries out quickly or where dry spring weather is usually experienced mulching the shrubs after planting will help to keep the roots moist. Suitable mulching materials are well-rotted manure, compost, or sawdust. A nitrogenous fertiliser such as blood and bone or sulphate of ammonia should be mixed with the mulch at 4oz. per shrub before the mulch is applied. The mulching material should be at least 2in. thick and evenly spread over the soil surface, not heaped round the main stem.

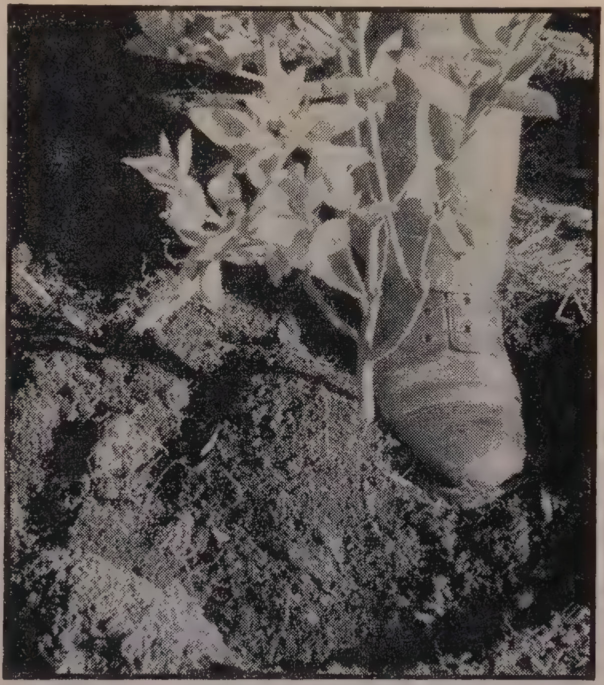
Branches damaged during planting should be trimmed back to a bud or side shoot once the plant is in position. Tips of quick-growing shrubs which have a tendency to become lanky should be nipped out. Shrubs which benefit from this are prostanthera, leptospermum, ericas, and bottlebrush.

The first crop of flowers on young shrubs should be thinned or removed altogether to allow a stronger branching system to develop. Stakes should be put in at the time of planting to avoid injury to the plants' roots.



[*Green and Hahn*

Tree roots in position in a suitable hole prepared for them. The rod shows the position of the nursery soil mark on the stem and indicates the depth of planting.



[*Douglas Elliott*

The soil should be firmed well about the plant roots.

[*Douglas Elliott*

Roots of a pot-grown plant being teased out before it is planted.

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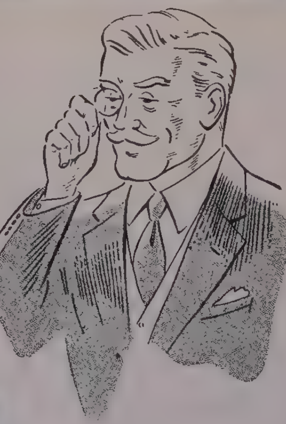

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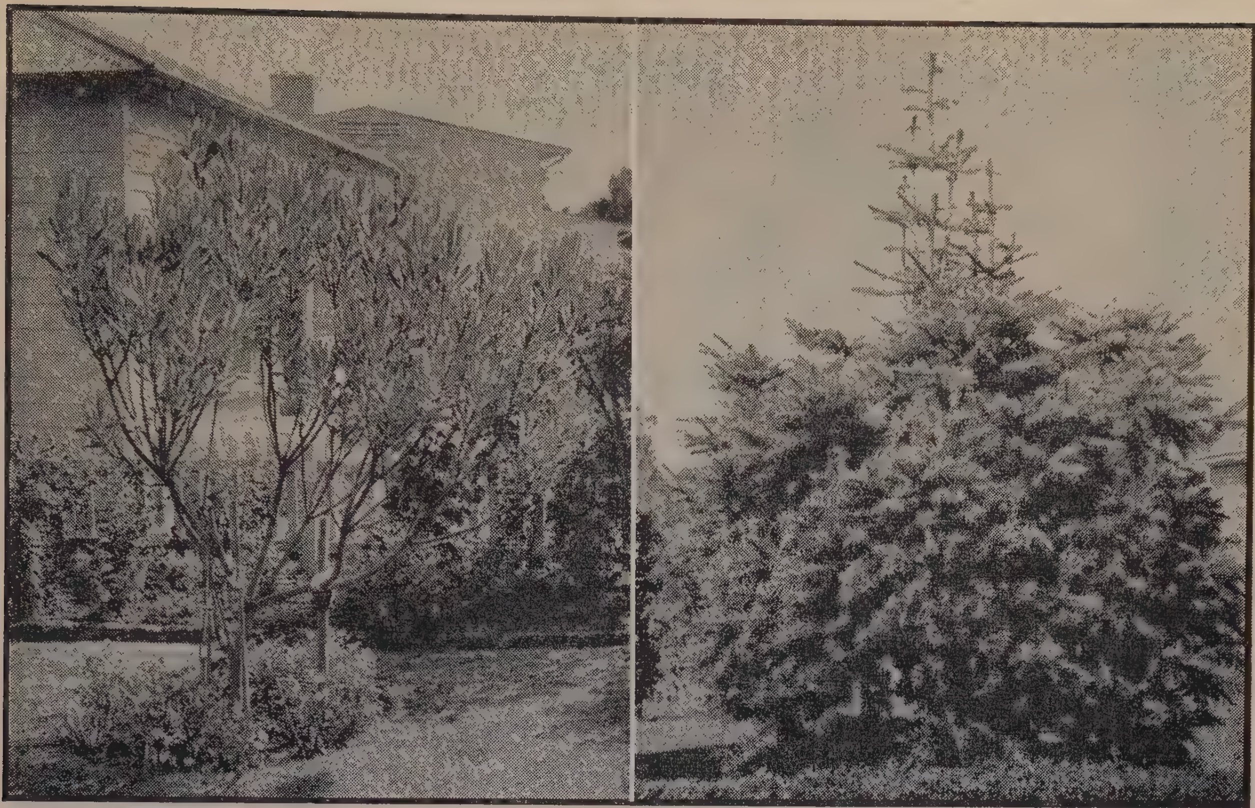

Left—Pruning carried out from the time of planting would have prevented the development of this ugly open base to a protea. One sturdy stake with two ties near the base of the trunk would provide more satisfactory anchorage than the method shown. Right—Multiple shoots of a conifer resulting from damage to the leader. These should be thinned out to leave only the most vigorous shoot.

Staking is necessary with all plants on standards or with tall plants which require support until their roots establish. Straight stakes of the correct height should be used and the stems tied securely, but not tightly enough to constrict growth. These ties need to be inspected from time to time and renewed or readjusted if necessary.

Staking of plants in exposed positions should be done with sturdy stakes driven well into the ground. Several ties, with the lowest near the base of the plant, anchor the roots far more satisfactorily than do single ties higher up.

Labels are better removed once the plants are in their permanent positions; otherwise they quickly become illegible and look unsightly. Names can be recorded in a notebook for future reference.

Where frost protection is required a temporary cover should be erected after planting, but it should not be so dense that it excludes all light and air from the plant. Brush or sacking supported by a wooden frame is suitable. The top of the shelter is more important than the sides, which can be left fairly open. If sacking is used, it should not touch the foliage of the plant. As these protections do not add to the beauty of the garden, they should be removed after the danger of frost is over and replaced the following winter, if necessary.

Moving or transplanting shrubs already established sometimes becomes necessary and provided the shrub is not too large, it may be carried out with every expectation of success. Two factors requiring special attention are: First, lift as much of the root system as possible with soil attached, and, second, reduce the amount of top growth by at least a third to maintain a balance between roots and top. This can be done most satisfactorily by thinning and by removing all weak and spindly growth so that the shrub's natural shape is maintained.

Planting Distances

Young plants need room to develop. When shrubs are young it is difficult to visualise their mature size and to estimate the amount of space they will require. All planting should be carried out with a view to the likely effect in 5 to 10 years.

For healthy, vigorous growth each plant requires ample room for its roots to penetrate in search of food, an even distribution of light, and to allow a balanced even growth, freedom from branches crowding into it. Dense shade reduces the amount of foliage on the shaded portion and correspondingly reduces the vigour of the plant.

Where rapid growing shrubs, such as prostantheras and wattles, are planted among slower growing, more permanent species to give quick effects, care must be taken to see that the faster growing shrubs do not overshade or grow into the permanent species and spoil their shape. If such is the case, it is better to remove the quick growing trees to ensure good specimens among the others.

PRUNING

Pruning is carried out to encourage the development of healthy, vigorous growth, to increase flower or berry production, and to maintain a well-shaped plant. It may also include reduction of size, where necessary, due to lack of sufficient space for full development of the plant.

Before pruning can be approached with confidence it is necessary to know something about the plant's growth and flowering habits. Shrubs differ widely in their individual characteristics and do not all benefit from the same treatment.

Some shrubs do not require pruning every year, but others benefit from regular attention. If methods are adapted to suit the requirements of individual shrubs, it is possible for them to derive much benefit from pruning. Pruning with no knowledge of the effects it will have on the shrub is better left undone until observation of the plant has given some clue as to the treatment it requires.

All pruning tools, secateurs, knife, or saw, should be sharp. Sharp tools make clean cuts which heal rapidly; blunt tools damage the cut end by causing bruising or tearing of the bark. Where large branches are removed saw cuts should be trimmed with a knife and the wound sealed with bitumastic paint or petroleum jelly against the entry of rots, moisture, and disease organisms.

All cuts should be made to a bud, a lateral growth, or back to a main

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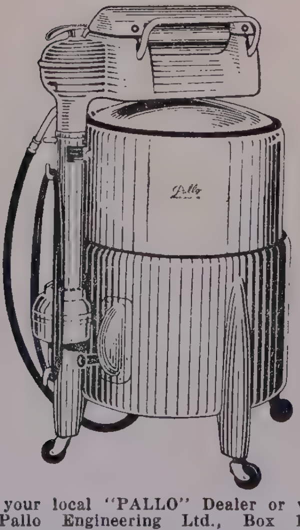

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branch. This applies at all times, whether flowers are being cut for indoors, diseased material is being cut out, or a shrub encroaching over the drive is being cut back.

Cuts made along a branch regardless of buds or side growths usually die back and form a stub which looks unsightly, provides entry for disease, and delays the production of new growth.

A branch may be removed at any time of the year without harming the shrub. This is useful where a shrub is causing inconvenience through growing too large for its position. When a large densely leaved branch is removed in summer the sudden access of sunlight to the previously shaded bark and inner growth may cause scorching. The effects of sunburn do not become apparent for a week or so, but where scorching is likely to occur gradual cutting back of the branch allows the sunlight to penetrate gradually and the inner branches to harden.

Though shrubs are individual in their characteristics and requirements, it is usually possible to divide them into groups which can be handled in a similar manner.

Spring flowering shrubs and shrubs which flower on young wood produced during the current season require pruning after flowering and before the seed sets.

The setting of seed is a drain on the plant's vitality and where it can be prevented by the removal of the spent flowers the vigour saved can be directed towards the production of new growth. Shrubs which benefit especially from removal of spent flowers are lilacs, kowhai, azaleas, and rhododendrons where the flowers only are picked off, as new growth breaks from buds immediately below them. Proteas, waratahs, bottlebrush, ericas, and manuka can be kept compact by pruning them every year after flowering, when all young growth can be reduced by half or more.

These shrubs are very quick growing and have a tendency with age to develop large expanses of bare trunks at their bases which do not carry flowers or foliage, and which detract from their beauty and usefulness.

Training to obviate the development of this leggy base is carried out by pinching out the growing tips of the plant several times during the first growing season and by regular pruning every year after flowering. This causes the branches to fork many more times than they would naturally, and brings the whole branch system lower to the ground and gives a compact shrub capable of creating a display right to the base of the plant.

Once a bare base develops in an older shrub of prostanthera, manuka, broom, protea, or waratah it is not as a rule possible to prune to get growth from it. Pruning of these shrubs should be carried out only in the young growth, as older branches seldom contain buds capable of breaking into growth. Cutting back into old wood is liable to result in a stub which gradually dies back and does not improve the look of the shrub. If a compact head is developed by pruning in their early years, these shrubs, as well as being more attractive, are less liable to be damaged by wind working their roots loose in the soil.

Acmena (right) and conifer which have been kept trimmed for 20 years.

Shrubs flowering on older wood or on flowering spurs on older wood differ in that they do not require much pruning. Examples of these are snowball, wintersweet, japonica, and witch-hazel. These shrubs are often slow growing in their early stages, and as flowers develop only on mature wood, they take several years before their flowers become a feature. Injudicious pruning carried out to speed up flower production on this type of shrub may have the opposite effect. Too much pruning means the constant removal of potential flowering material, and often the pruning causes an excessive amount of new growth which does not flower, yet makes a screen hiding the flowers produced inside the bush on older wood.

Pruning of these shrubs consists of cutting out old spent wood and weak growth, especially old twiggy growth from the centre of the bush, to allow light and air to penetrate.

Berried shrubs do not require much pruning, but where this is necessary they are best pruned while the flowers are present; in this way it is possible to see where the berries will be, and cut away unproductive material. Pruning in spring, before the flowers develop, may mean the loss of many potential berries and tends to encourage rank young growth which does not crop and masks the display of berries on older wood in the centre of the bush.

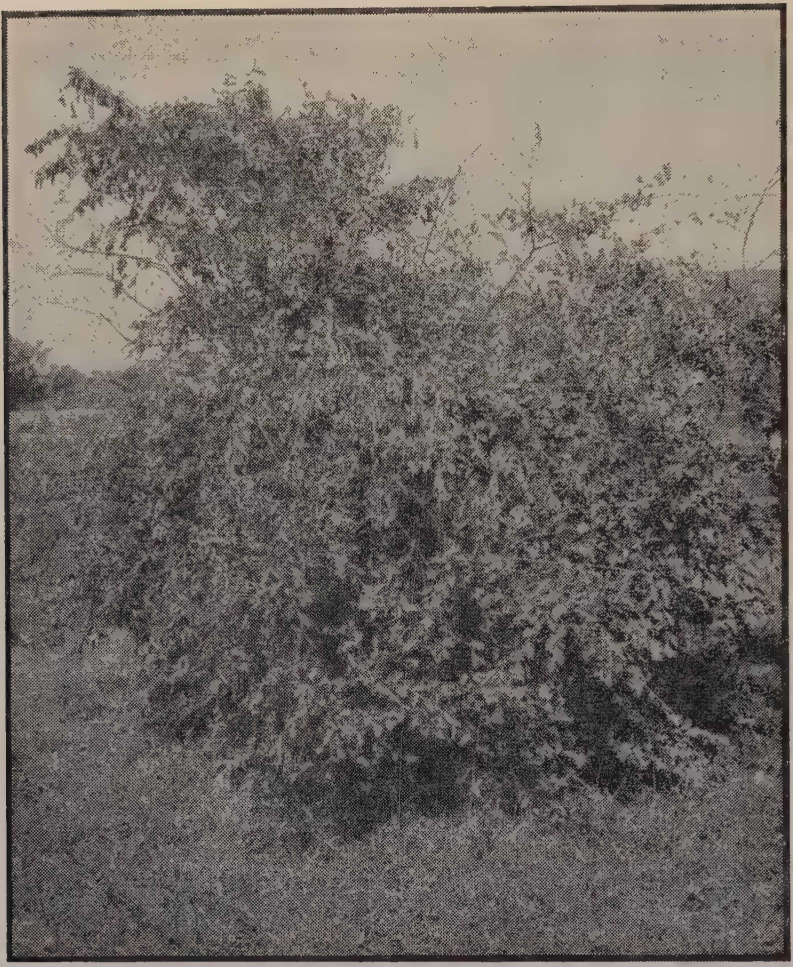
Shrubs requiring different treatment again are those which develop new growth from ground level to replace worn-out growth. Examples of this are bouvardias and *Spiraea bumalda* Anthony Waterer and ceratostigma. These should either be left completely alone or cut practically to ground level after flowering. Light cutting back of the tops of these has a stunting effect and does not encourage the development of a greater number of flowers.

Conifers and large-leafed evergreens require little pruning, but if it is necessary, it should be carried out during spring while the plants are in active growth.

Where disease is suspected of causing death of a branch or limb the affected limb should be cut well back to healthy wood to try to eradicate the trouble.

Fireblight in pyracantha or cotoneaster may sometimes be eradicated if it is detected early and cut out well below the visibly affected point on any branch. As this disease can be transmitted by contaminated pruning tools, care should be taken to avoid cutting into affected wood. This disease cannot be controlled by spraying.

Silver leaf of ornamental cherries, peaches, and plums is another disease for which there is no known spray control. Once a tree becomes infected it is seldom possible to eradicate the disease, but removal of infected limbs and disinfection and protection of the wounds may prolong the life of a tree and sometimes effect a cure. It is best to cut the branches out during summer.



Fireblight on this cotoneaster has resulted in a straggling bush and much dead and dying wood. With the disease advanced to this stage the shrub should be cut out and burnt.

Borers in large limbs may be killed by injecting a solution of equal quantities of **tar oil emulsion** and water, repeating the treatment at intervals until all signs of borer activity cease. Alternative treatments are with petrol or kerosene, but the latter may injure the bark of some shrubs if it is spilt on the outsides of the branches. The borer holes should be plugged with putty or earth after treatment. Smaller branches and twigs should be cut out below the affected point and burnt.

Pruning out of branches to control diseases such as these should be done early to have the best chance of success.

Damage to growing tips often occurs where a shrub has been waterloged during winter. The primary step is to improve drainage, but removal of all the dead tips will help to get the shrub into active growth.

Part of a shrub's beauty and usefulness lies in its individual and characteristic shape and this should be retained in pruning. Pruning to straight lines should be avoided. No shrub grows naturally with a levelled off top; the centre of the shrub or tree is usually higher than the outer branches. There is a wide range of shapes from which to choose and if a shrub is required to suit the garden layout, plant one whose natural habit is to grow that way. Trimming and clipping shrubs may keep them symmetrical and neat, but it does not eliminate or correct structural faults. In extreme cases, such treatment may destroy the shrub's characteristic habit and reduce it to a characterless mass of foliage which neither flowers nor fruits. Cutting to an outward pointing bud causes branches to grow outwards and should be practised to prevent crowding of the centre. Judicious cutting out of unwanted material and watching the position of the buds being cut to will help to maintain a true shape. A well-pruned shrub after a season's growth should look so natural that it should be thought to be unpruned.

Italian cypress (*Cupressus sempervirens* var. *stricta* Aitk.) is not difficult to handle, yet more time is spent in training this tree than possibly any other species. Among Italian cypress trees there is a wide variation in seedling types, causing tremendous differences in the shape and branching habits. Some types grow naturally with a slender graceful habit and a fine tip, others branch out at the bases, and others again branch widely at the tops. With all of them there is a tendency as the branches grow longer for them to become heavy and pull down with their own weight.

Where this occurs the individual branch should be tied in to the trunk or if the tendency is observed early enough, the branch can be shortened so that it springs back into position. If this treatment would leave a gap further up the tree, each heavy branch should be tied in individually.

Training these trees by wrapping them round with twine or wire is most unsightly; not only does it spoil the look of the tree, but it detracts from the whole garden scene.

Where Italian cypress trees are kept trimmed clipping should not be so hard that it cuts back into older wood, as there are seldom dormant buds in older wood capable of breaking into growth. With all conifers, to be sure of new growth, pruning cuts should be made only into green wood.

Conifers such as cedars and thuja have naturally a symmetrical shape with a well-defined leader. Where this leader is damaged it should be cut down to the next vigorous side growth. This growth, tied as near to perpendicular as it will go, will gradually take over and replace the damaged leader.

Developing a main trunk on young trees consists of removing any vigorous growth arising from the stem which appears to be about to compete with it. With silver birch, cherries, and idesia, a vigorous growth may arise from the base of the plant and, if allowed to remain, would spoil the symmetrical shape of the tree.

In shrubs, too, often one branch will bolt ahead of the others. An exceptionally vigorous growth should be cut out while still young or shortened back to fit into the shape of the remainder of the bush. Otherwise it may rob the remainder of the shrub of its share of food.

Suckers or growth arising from the stock should be rubbed out as soon as they are observed. Many ornamental shrubs have been worked on to a rootstock of another variety; if growth from the stock is not removed, it may eventually take charge. Where green foliaged branches are observed coming through the centre of a coloured or variegated shrub they should be cut out, as in time they would overwhelm the coloured portion.

Horizontal and prostrate shrubs, for example, rock rosemary and *Cotoneaster horizontalis,* need any perpendicular shoots cut back to maintain their low-spreading habit.

Where trees are planted under overhead wires low-growing subjects should be chosen and pruning started from the early years so that the tree can have a reasonably normal outline, even though it is restricted in height.

Cutting branches of shrubs for decorative work is a form of pruning, and as well as cutting pieces to suit the arrangement, it is as well to remember the future usefulness of the shrubs or trees and modify the cutting accordingly.

Pruning, carried out with a definite object and with a knowledge of the habits and characteristics of the shrub, can do a great deal toward increasing the value and beauty of shrubs, especially when carried out in conjunction with good cultural practices of manuring, mulching, and cultivation. Indiscriminate cutting back of shrubs is to be deprecated because it can nullify much of the work put into caring for the shrubs.

GARDEN WORK FOR JUNE

Conditions underfoot in June are invariably cold and wet so it is not considered a good month in which to do much planting in the garden. The period from July to September is more suitable.

Lawn Maintenance

In new lawns when the grass seedlings are about 1in. to 1½in. high roll the surface with a light roller to firm the soil round the roots and to smooth the surface. A few days later the lawn should be topped with blades that are set high on the mower. Throughout the first year the blades should be kept fairly high to promote more vigorous growth, which will provide a more rapid cover. As plants feed through their leaves, any undue reduction of leaf growth reduces the vigour of the plant. If the young grass is yellow and unhealthy, apply 3 parts of sulphate of ammonia and 1 part of superphosphate at 1oz. per square yard. This fertiliser dressing is recommended every 3 months in the first year after sowing and at least once a year in spring of subsequent years.

Weed Control

Tasks such as controlling weed growth on drives, paths, tennis court surrounds, and waste places can often be done in June. A preparation based on arsenic is the most satisfactory poison for this purpose, and if small quantities only are required, it would pay to purchase a pound of arsenic pentoxide from a seed store. It is sold in tins with directions for use on the containers. Great care should be taken when arsenical weedkillers are handled and the directions on the container should be followed closely.

In a garden shed it is very easy to confuse weedkillers with fertilisers, or for weedkillers to contaminate fertilisers. They should be stored well apart from other materials and if poisonous, kept locked away separately. It would be preferable to have separate buckets and watering cans for mixing and applying weedkillers and these containers should be given a distinguishing mark with paint so that they will not be confused with those used for general garden operations.

Liming Ornamental Shrubs

Most ornamental shrubs will tolerate slightly acid conditions, but some definitely will not tolerate alkalinity; therefore it should be a rule not to add lime to the flower garden. The only time this rule should be broken is when carnations, delphiniums, hydrangeas, and a few other plants that respond well to lime are not grown in close association with others, and then a sprinkle of carbonate or agricultural lime annually is all that is recommended. Lime on hydrangeas has the effect of turning them pink and aluminium sulphate turns them blue. Aluminium sulphate has an acidifying effect on the soil so when added in excess it may cause growth to be retarded. If alum is used, heavier quantities must be applied. The time to apply aluminium sulphate crystals to the soil is in late winter. As a liquid at 3oz. to 1 gallon of water it should be applied every 10 days from the time the flower head appears to the time it opens. It should be applied only when the soil is moist.

Herbaceous Border

Winter is not the time to renovate the herbaceous border. The work is best performed in autumn, as it gives the perennials a chance to become established before the worst of the winter and as a result they produce early spring growth. Autumn flowering perennials, if necessary, should be lifted in spring.

Bedding Plants

Spring flowering bedding plants that can still be planted in milder districts if the soil is workable are stock (Beauty and 10 Week), wallflowers, *Primula malacoides*, antirrhinums, and sweet william. Indian Carpet is a new dwarf sweet william that provides a brilliant carpet of colour.

When annuals or bedding plants are planted in winter compost or animal manure should not be incorporated in the soil, as its property of retaining soil moisture is detrimental to plant growth throughout the cold months. Free drainage is all important at this time of year. A well-balanced fertiliser should be hoed in before the seedlings are set out.

Fertilisers

A stock of fertilisers should be obtained now in preparation for spring planting and topdressing.

A well-balanced fertiliser suitable for hoeing into the soil before planting and ideal as a topdressing in late spring for the perennial border and shrubbery is 3 parts of blood and bone, 2 parts of superphosphate, and 1 part of sulphate of potash. As violets will be flowering shortly, a generous dressing of the balanced fertiliser is recommended to stimulate growth.

Mixed soluble nutrients are now available from seedsmen. These nutrients are soluble in water and when sprayed on to the plant foliage are absorbed by the leaves. They should prove most useful for stimulating growth, especially of annuals, throughout a cold wet winter when the soil nutrients are unavailable. They may be sprayed on to recently planted shrubs and lemons that are not showing much sign of growth. Summer sprays during dry periods will also be of advantage. One gallon of nutrient spray should be sufficient for many plants if applied through a fine-rosed spray pump. Add a wetting agent to the spray.

These nutrients can be combined with insecticide and fungicide applications.

Seven- to ten-day intervals between sprays should provide best results, but this new method of applying food to plants cannot be substituted completely for soil applications. In many cases, it can only be a supplement to the nutrients taken in through the roots.

Diseases and Pests

Azalea leaf disease (*Exobasidium vacini*): This fungus produces abnormal pale pinkish swellings on the leaves of the evergreen azaleas and the body of the fungus penetrates the shoots. Infected material should be cut out and burnt and the plants sprayed with Bordeaux mixture (4oz. of bluestone, 5oz. of freshly hydrated lime, and 4 gallons of water) or proprietary copper oxychloride materials.

Azalea leaf miner (*Gracillaria azalealla*): Red patches appear on the leaves and leaves curl when this insect is present. Caterpillars and cocoons are found on the under sides of the leaves in the curled portions.

Control may be obtained by spraying with 2 teaspoons of H.E.T.P. and a heaped dessertspoon of 50 per cent. wettable D.D.T. powder in 4 gallons of water once per month.

Thrips on gladiolus corms: Gladiolus corms cleaned of the outer skin should be dusted with a low percentage D.D.T. dust in winter.

Cottony-cushion scale on hydrangeas: White patches of a cottonwool-like deposit are produced by scale insects on the stems and leaves of hydrangeas. The way to eradicate this unsightly pest is by using winter (red) oil at 1½ pints to 4 gallons of water when the plants are dormant or summer (white) oil 1 pint to 4 gallons of water during the growing season.

Rose diseases: Unsuitable soil, cultural, and weather conditions often cause die-back of stems due to the wound parasites blast (*Pseudomonas syringae*) and wound canker (*Heptosphaeria coniothyrium*). Control is by cutting out and burning infected material and spraying with Bordeaux (6oz. of bluestone, 5oz. of freshly hydrated lime, and 4 gallons of water) or copper oxychloride (1oz. to 1 gallon of water). Red oil may be added with this spray. Always apply Bordeaux at the end of autumn and after pruning in late winter or early spring.

Glasshouse Culture

Late chrysanthemums should be cut down and placed under glass. Cuttings of late chrysanthemums may be taken, as they need a longer growing period than the early flowering varieties.

Sow cyclamen, antirrhinums, lobelia, stocks, verbena, marguerite carnations, glasshouse tomatoes, and sweet peas.

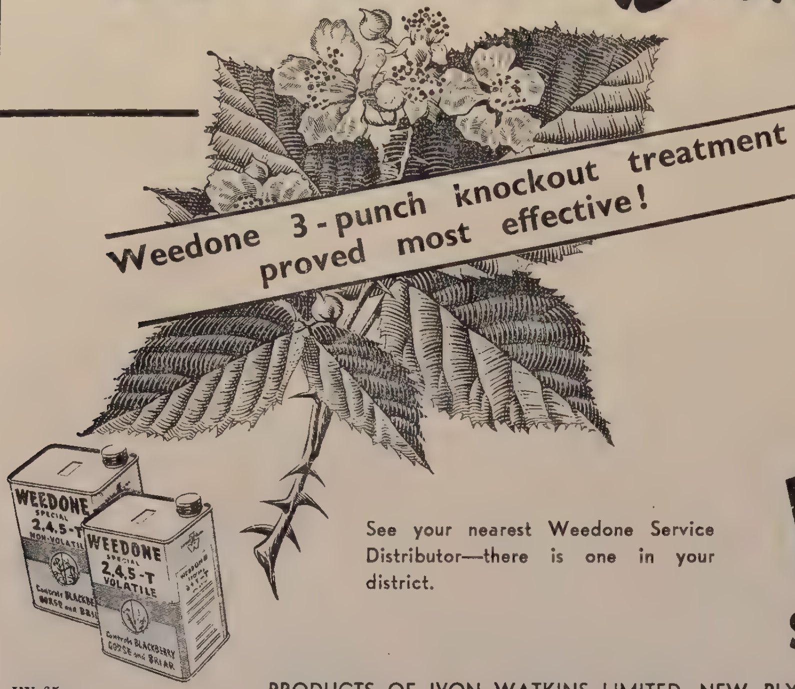
Pot plants should be watered moderately. Cinerarias, cyclamen, and primulas are liable to decay if their crowns are saturated with water.

Soil in pots should be stirred occasionally on the surface to prevent fungus, lichen, and moss growth developing and to promote aeration. The new soil conditioners added to potting soils will assist aeration and soil moisture retention.

Bulbs may be brought in from outside for forcing. They should be shaded for a few days until the shoots become a full green.

Glasshouses should be ventilated when possible and on dull days fire heat should be cut down.

Control *Blackberry*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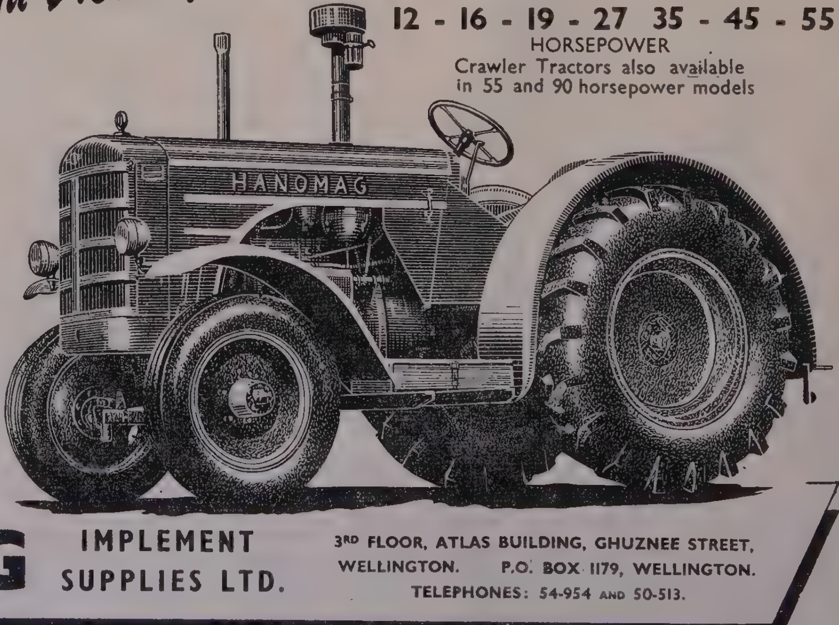

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Designed Flower Arrangement

THE variety and scale of design possible in flower arrangement are greatly increased if enthusiasm, imagination, and an appreciation of the finished design's relationship to its surroundings are possessed by those arranging the flowers. Rooms and their furnishings may vary considerably, and if harmony as well as colour is desired with floral decoration, close appraisal of a room's main features and the type and quantity of furniture is essential. Among such furnishings tables give some of the best opportunities for imaginative flower designs, and in continuation of her series of articles on designed flower arrangement Margaret O'Brien, Horticultural Department, Massey Agricultural College, Palmerston North, describes the factors which must be considered in arranging flowers for tables, and also gives advice on wall vase and miniature arrangements.

THE complete picture of a beautifully set dining table is made up of the flower arrangement, the china, the silver, the cloth, and the table itself. There is sometimes a temptation when arranging flowers on a table for a special occasion to make too much of the flowers, so that they become unduly conspicuous rather than contributing a well-blended note of interest, colour, and freshness to the completed table. In table setting the harmony of colours and of textures throughout is a very telling factor. The nature of the occasion, a formal dinner, a wedding breakfast, a children's party, a buffet meal, or an informal luncheon party, will influence the general plan. A few fresh flowers or merely a few interesting leaves carefully designed make all the difference to the simplest of tables.

TABLE ARRANGEMENTS

Tall flowers are apt to make conversation difficult across a table and are likely to be out of proportion. A few very light high lines are suitable on a large table, but nothing massive as well as tall is practicable. Horizontal designs are often more suitable than vertical ones.

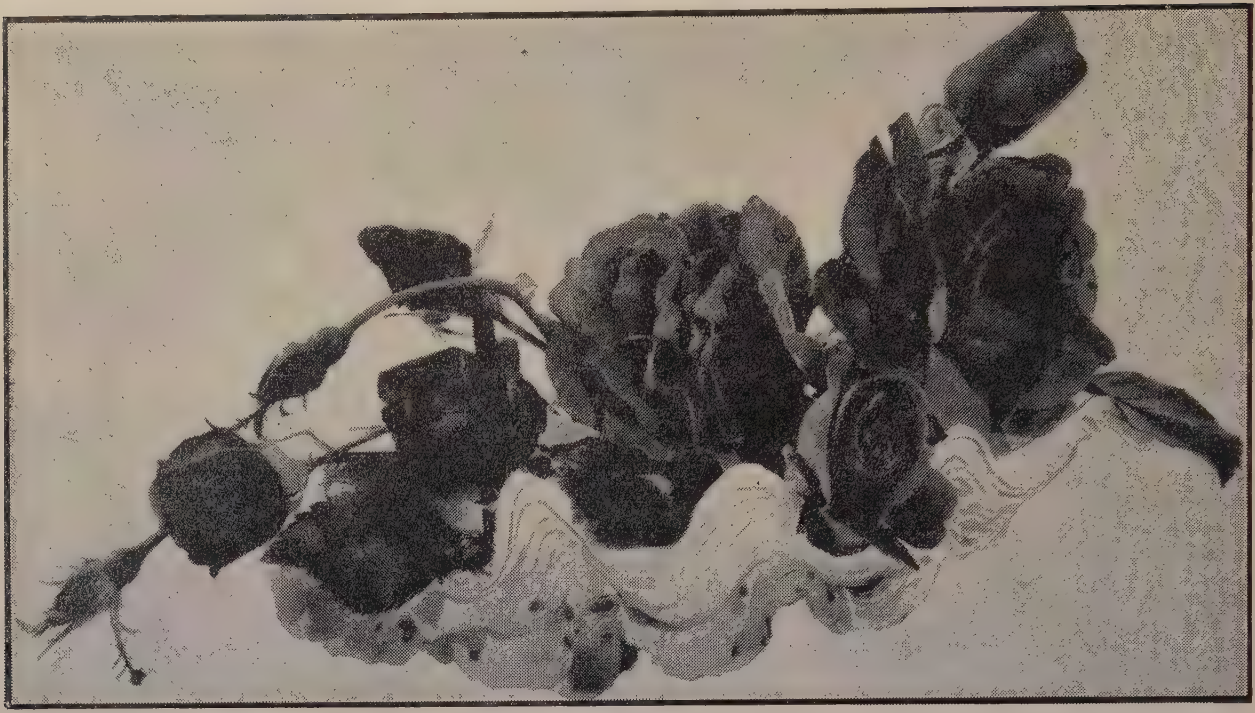
Horizontal Designs

Horizontal arrangements of flowers are reproductions of simple vertical formal and informal arrangements, differing from them only because they are designed to be looked down on and from all sides. Their use is not restricted to dining tables; they are the most suitable form of design for low occasional tables, chests, low shelves, or even the floor.

For horizontal designing the line of height becomes the line of length. Its exact measurements are determined by the laws of good proportion in relation to the furnishings, for example, the size of a table or of a low cabinet, rather than in relation to the container, which is seldom much in evidence in such arrangements. If the design is for a central position, it will be formal, of equal length each side, and centred by a focal point. If on the other hand it is to be placed across the corner of a table or on the end of a low bookshelf, it will be informal, having one longer side balanced by a shorter, heavier side, both radiating from a focal point.

For horizontal arrangements, as for vertical arrangements, a suitable outline is established and then the focal point (in horizontal arrangements it is the highest point also) is placed. Filling-in is done with material which radiates easily from the focal point and is bounded by the outline. Theoretically the order is outline, focal point, and filling-in, but as for vertical arrangements this routine cannot always be followed exactly. As long as the focal point can be visualised accurately, it is often more practical to add at least part of the filling-in before placing the focal point in position.

These arrangements are very suitable for short-stemmed flowers; for example, it is often possible to use the ends of gladioli from a tall arrangement that is past its best, provided of course that they are still quite fresh, and to centre them with a few short-stemmed roses or a few single gladioli flowers. Vines, ivy, Virginia creeper, climbing roses, and similar plants make admirable lines of length, lines which are more natural on the horizontal than those obtained with very straight flowers such as irises and daffodils. A focal point for Virginia creeper can well be made with a few of its own larger and more deeply coloured leaves, and a group of bright pink camellias looks well in a frame of dark green ivy. Even a well-grown spray of blackberry makes the ideal setting for a bunch of green, red, and black blackberries, provided the plant from which they are picked is well grown and free of dust; otherwise the



[*Perry*

An informal horizontal arrangement of red roses in a shell. The wider end of the shell holds the widest part of the design and the largest roses form the focal point. The smaller roses and buds lie along the length of the shell.

effect will merely be depressing. However, vines are by no means the only possibility. Flat sprays of leaves with interesting curves, and long, slim spikes can also be used. The fluffy heads of solidago (golden rod) make good outline and support for the deeper gold of coriopsis and the warm brown of miniature sunflowers or glowing autumn helianthus.

Dining Table Arrangement

When a design of flowers for a dining table is needed, first to be decided is what the occasion demands. The colour scheme is next in importance. This generally will depend on the colour of the dinner service to be used. It may be comparatively simple to vary the cloth and accessories, but the same china is usually used for many occasions. When new table china is being bought consideration should be given to whether the design will harmonise with a variety of interesting flower arrangements. If the dinner service is patterned in several colours, a suitable arrangement in tints, tones, or shades of one of these colours should be chosen for any flower arrangement for the table.

For a night setting tints of the colour will be the most satisfactory. The dimmer the lighting is the paler the tints will look and the more white it will be necessary to add. If all the colours of a multi-coloured service are repeated in a flower arrangement, the usual result is a rather distracting spottiness. For use at night china of simple design and pale colour is the easiest to harmonise with flower colours, and containers in silver, white ware, or crystal are best. Silver, as a metal colour, is regarded as white; it also forms a link with the silver on the table and adds a touch of brightness in reflected light. Crystal will also reflect light, as do glasses and similar table accessories. A white container usually fits in well with any dinner service. Good china, sparkling crystal, and gleaming silver call for a fine linen cloth, or good mats on a highly polished table. With these go flowers of delicate petal texture and colour such as roses, camellias, carnations, gladioli, begonias, and white violets. The texture of lily petals cannot be surpassed, but the flowers are usually too large and the scent too strong.

Designs for Informal Occasions

A contrast to a table set for a formal dinner would be a gay luncheon table set in strong blue, centred by an arrangement of orange-red, orange, and orange-yellow nasturtiums in a yellow container, with table mats in fawn seagrass on dark polished wood, water glasses in blue-tinted crystal, and a pair of ornaments in blues and blue-greens. If place cards were necessary, they could be supported by miniature sheaves of golden corn, or something equally casual and informal.

Articles on the table should be so arranged that the highest point is in the centre and all other material graded down gradually to the outer edges. The change in height is too abrupt if a tall, slim ornament is placed in the middle and the next level is much lower. On the other hand a flower arrangement only a few inches high appears too flat if it is flanked by tall accessories and dishes. Generally the centre-piece is flowers, but not always; a suitable ornament may well be used, with a pair of flower arrangements placed one on either side of it and a little lower. Another suggestion for a party at night is to repeat the central arrangement in sprays at the edge of the table which the guests can wear later.

The outline of the flower arrangement should repeat the line of the table: A round container and a round design for a round table, an oblong design for an oblong table, and a very long, slim design for a long, narrow trestle table used for a large gathering. For the last-named it would probably be necessary to lengthen the design by repeating it on a smaller scale toward each end of the table. Under these conditions it is often better to use material which has been very thoroughly soaked and to dispense with containers. Needle-holders are easily concealed in long, low arrangements; if it were possible to find enough containers of uniform size and colour, they usually take up too much space on a crowded, narrow table. Some dark green leaves, of decided form, will supply the impression of weight and substance at the base of such arrangements.

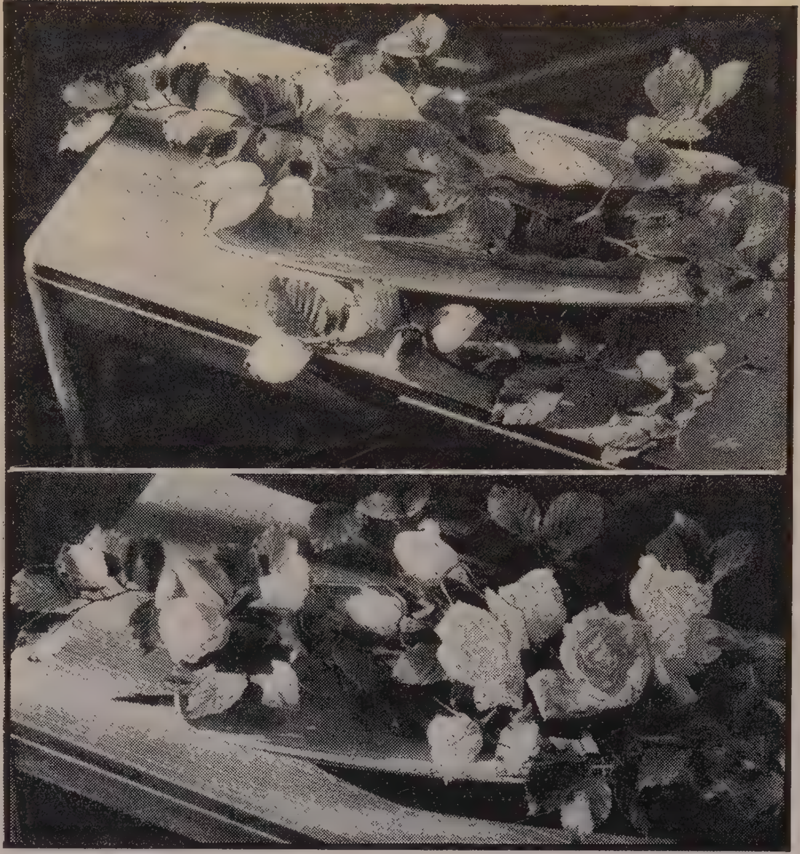
Buffet tables which are placed with one side against a wall require different treatment. Here table space can be economised by use of an upright arrangement. A central position directly against a wall calls for a completely formal design, as shown in the completed arrangement illustrated on page 395 of the April "Journal". The primary line of this arrangement is the highest point of the completed picture, from which all the other furnishings should descend in a gradual line, arranged in pairs on either side of the centrepiece. Glasses stand in two rows according to size, plates are divided into two equal piles according to size, silver is placed in equal rows, and ornaments or accessories must also be in pairs, so that one can be placed on each side of the central arrangement.

Table setting gives much scope for originality and imagination. For formal dinner parties it is probably more satisfactory to concentrate on a collection of good-quality, more expensive items which will contribute toward a harmonious whole in colour, texture, and quality, though it may take a long time to collect all that are required and though they will have to be used over and over again. In the search for ideal additions to this collection it is a mistake to give way to the temptation of buying the attractive odds and ends which can be acquired from time to time, but which do not really find their niche in the completed setting. Patience is sure to be rewarded eventually; a perfect result is well worth waiting for. Material for jaunty, casual luncheon tables is quite another matter. The standard required is not so high; the range of suitable daylight colours is much more varied and vivid; cloths can be made of inexpensive gay cottons, and some more venturesome folk even paint bone-handled cutlery to match; the plant material may be anything from a miniature cactus garden to a basket of daisies. No orthodox bounds are set, and there is only one inflexible condition—that the completed picture be one harmonious whole.

WALL DECORATIONS

Wall Vases

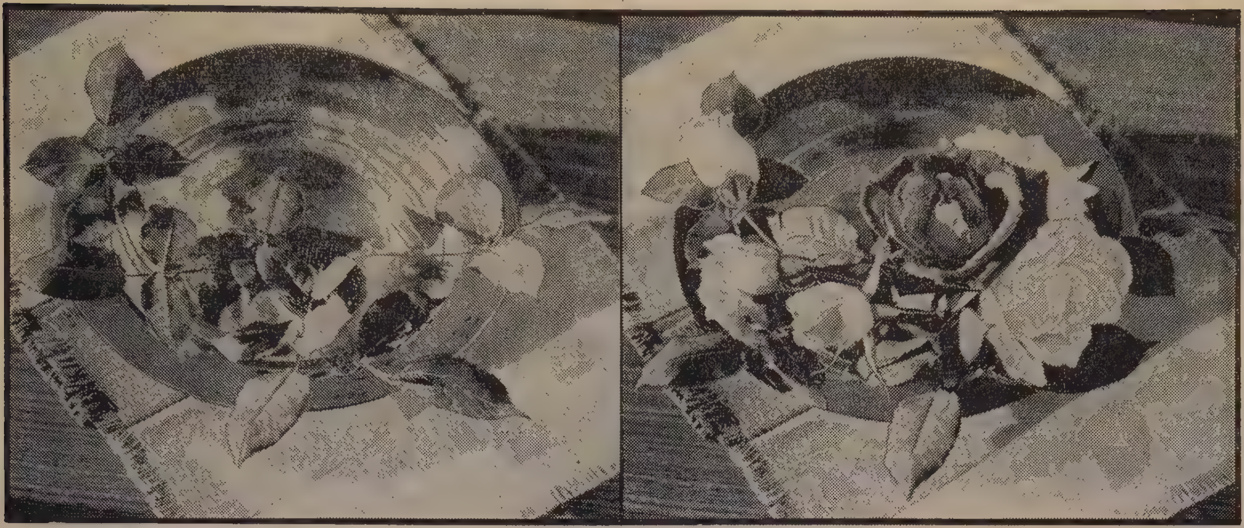
As the three essential factors which make a complete flower picture are the plant material, the container, and the surroundings, wall vases must be selected with care. Wall vases fall into 2 classes, ancient and modern. There are many of the latter type on the market, usually stream-lined and severe, suitable accessories for a modern room, but quite unsuitable for



An informal horizontal arrangement in a light, unstained wooden dish suitable for a long dining table or a heavy chest. Upper—The outline is of golden-brown beech leaves. A long branch makes the line of length and shorter branches fanned out give width at the other end. The pieces on the table have right-angled stem ends for easy placement. The small container in the wooden bowl is for holding water only and does not show in the completed arrangement (lower), which has a focal point of wide-open yellow roses and a line of length emphasised by half-open flowers and buds of the same rose.

A formal horizontal design suitable for a formal setting in the middle of a table.

Wall Designs



A semi-circular, informal horizontal arrangement suitable for a round table. The outline of rose leaves is wide at one end and its line of length follows the curve of the container. Right—The completed arrangement has large red and pink roses as the focal point and paler pink to white buds to form the line of length.

a room of elegant period furnishings. One suggestion for flowers on the walls of an old home is to use a flower box, framed in an antique frame, and to place in it a period arrangement of appropriate dimensions. An old-fashioned bracket can sometimes be found and used to support a similar period arrangement. For owners of the older types of homes a little effort in looking for these antique accessories for flowers on walls is well worth while. To use a modern wall vase in such a setting is to introduce a very discordant note.

Arrangements for all types of wall decorations have one thing in common—as they will be at least on eye level and probably a little higher, they must be designed to be looked up at. This calls for material which will naturally come out over the edge of the container and hang well down. For modern wall vases a reliable guide is to have one-third of the flowers above the rim of the container and two-thirds below, but these proportions will vary a little according to the material used and the height of the wall vase. A stiff fan-shaped arrangement of flowers, all above the rim of the container, has little to commend it. Plants which naturally grow downward such as ivy, ivy-leaved geraniums, cobeas, and many other vines are of course the simplest to use. Also suitable are branches with good curves, especially if they have a piece of older stem almost at right-angles to the curved portion; this allows the stem to fit easily into the container and the branch to hang down on much the same angle as it originally grew, rather than standing stiffly aloof or appearing to have been unduly bent and coaxed into position.

The general effect of flowers on a wall will be a silhouette, which means that restraint must be exercised in the amount of material used. Therefore a comparatively small number of stems will be placed on the holder within the container. The sort of holder to use with a wall vase is always a problem. The tapering shape of wall vases rules out needle holders. Probably the only solution is a compromise between a cage holder and crumpled chicken netting, on the lines of the holder at the right of the illustration on page 180 of the "Journal" for February 1954. When a good outline

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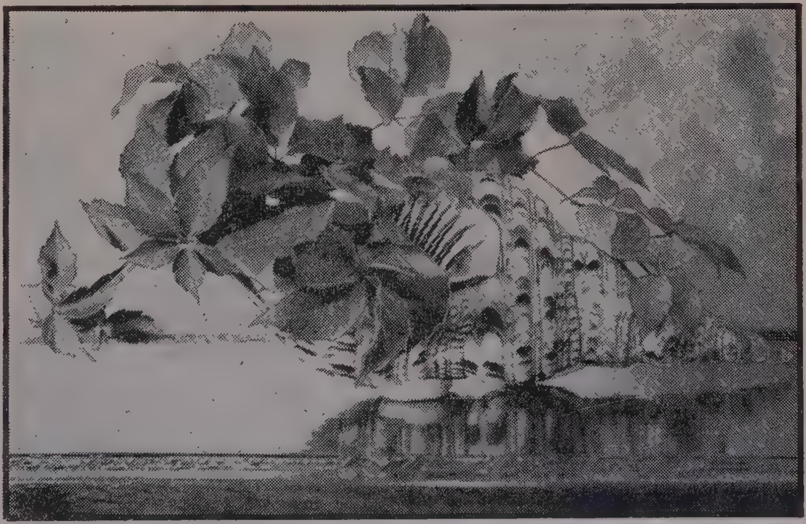
Illustrations opposite: Upper left—A flower box or shadow box. The frame of the box is blue, the outline of the arrangement is of bare magnolia branches, and the arrangement is centred with deep-pink azaleas and filled in with pale-pink *Prunus*. The container is an old silver sugar basin. Upper right—A wall vase with a simple outline of small ivy leaves and a focal point of larger and variegated leaves. Lower left—An outline of camellia leaves forms a frame for scarlet flowers. The arrangement is not completed and requires two more blooms on right-angled stems to break the expanse of wall vase and to carry the line of colour down on the left side. Lower right—An old wall bracket is more suitable than a modern wall vase for a room with old-fashioned furniture.



The brown and cream shell wide open at one end and tapering to the other suggested a horizontal line to repeat its shape. Large deep-red and tawny Virginia creeper leaves made the focal point and necessary width, and a trailing end, still green but flecked with red, followed the length of the shell.

has been firmly secured, preferably with only two or three well-chosen branches or tendrils, the focal point must next be placed. It may be a few flowers, a bunch of berries, or merely larger and more deeply coloured leaves than those on the outline branches. Its position will be well out over the edge of the container, so that it supplies actual depth to the arrangement and also breaks the hard line of the rim of the container. A little filling-in, radiating from the focal point and closely following the outline, completes this arrangement.

Flower Boxes

A flower box is made with an old picture frame which has had a box built in at the back of three-ply. The flower box can be hung just as a picture is hung (see upper left illustration on page 516), provided the eyelets are placed so that the frame hangs properly when the box is holding a container and flowers. If the box is to be permanent, it can be screwed on to the wall; the screws should be so placed that any flower arrangement will conceal them. The size of the flower box will depend on the size of the room and also the area of clear wall space on which it is to be hung. Plenty of wall space is necessary if a flower picture on a wall is to be shown to full advantage. Other large pictures which compete with it on the same wall will prove distracting. Such a flower picture should be the feature of interest on a wall, with other ornaments or small pictures as accessories to it.

When the size of the flower box and a frame suitable to the rest of the furnishings has been decided on, the next step is to find a container which exactly suits this setting. Its size must be such that an arrangement one and a half times its height fits easily into the flower box, with an inch or so to spare. A flower picture must not appear to be crowded into its frame, nor is it permissible for it to exceed the bounds of the frame, for it should represent a picture of flowers within a frame. It is often not possible to arrange one-third of the material above and two-thirds below the rim of the container, but it is usual to bring the lower lines almost to the bottom of the container. These stem ends, tendrils, leaves, or whatever they may be should hang just clear of the base of the flower box, not be supported by it. The same rule applies to horizontal designs, which lose much of their charm if the ends sprawl weakly on a table top, but which look fresh and crisp if the ends turn up even slightly or at least support themselves firmly just clear of the table surface.

A flower niche built into the wall of a modern room is another possibility. Some niches are long and so low that they require an almost horizontal design, and some closely resemble a flower box. While the subject of what may be built into a house to aid flower arrangement is being discussed, mention should be made of concealed lighting. Though not common in New Zealand homes, it is worthy of consideration. A bulb concealed so that it throws a pool of light on an arresting flower arrangement creates a distinctive centre of interest in a well-designed room.

FLOWER MINIATURES

The construction of flower miniatures is exactly the same as for larger arrangements; outline, focal point, and filling-in should be in correct relation to the container and the surroundings. The vital factor in this type of arrangement is correct proportion. The all-over measurement for the line of height of a true miniature is 4in. or less and for a semi-miniature 6in. or less. These are measurements for classification at flower shows and of course need not be adhered to strictly in other settings, but they give an indication of how small a real miniature should be. If the line of height is 6in. from the base of the container, to be in correct proportion the container can be only about 2¼in. high, and a choice of containers suitable for a true miniature narrows down to something tiny, such as a thimble or a walnut shell. Flowers which are in good proportion to these small containers are so small that considerable patience is required in arranging them. Many of the common weeds provide suitable material, as do some rockery plants. Single flowers of forget-me-not, boronia, buttonhole roses, and a host of others are small enough if they are handled individually. For a collection of such minute flowers a well-grown pansy, for instance, would form a focal point quite overwhelming in its comparative size.

A miniature can be designed horizontally as larger arrangements are. A salt cellar and a sea shell are suggestions from the long list of tiny things that can be collected and tried as containers. For everyday use miniatures are valuable accessories to larger arrangements and are also suitable decorations for breakfast trays. A large bunch of violets or a handful of sweet peas can be most inconvenient on an already crowded tray, and of course quite out of proportion, whereas a miniature which emphasises the colour scheme of cloth and china is a delightful addition.

As accessories, miniatures made from the scraps of the smaller flowers left over from a large arrangement add a pleasing note of repetition and save flowers which might otherwise be discarded as useless. Many a good flower design is not as perfect as it might have been, because two or three flowers which were left when the arrangement was obviously complete have been added. These few flowers may not be suitable for a real miniature, but they will very often make a simple, small design which will be an asset to the larger one. If a quantity of flowers is available for arrangement in one room, the maximum effect can be obtained by designing one really arresting flower piece for the focal point of the room and using the flowers left over for one or perhaps two comparatively small arrangements to be placed in less conspicuous positions. These will be a complement to the larger one and a repetition of at least some of its colours, rather than distracting attention from it by sharp contrast. To divide a quantity of flowers into four equal parts and place four mediocre designs on any piece of convenient furniture, irrespective of the arrangement of the room, is no way of using flowers to their full value.

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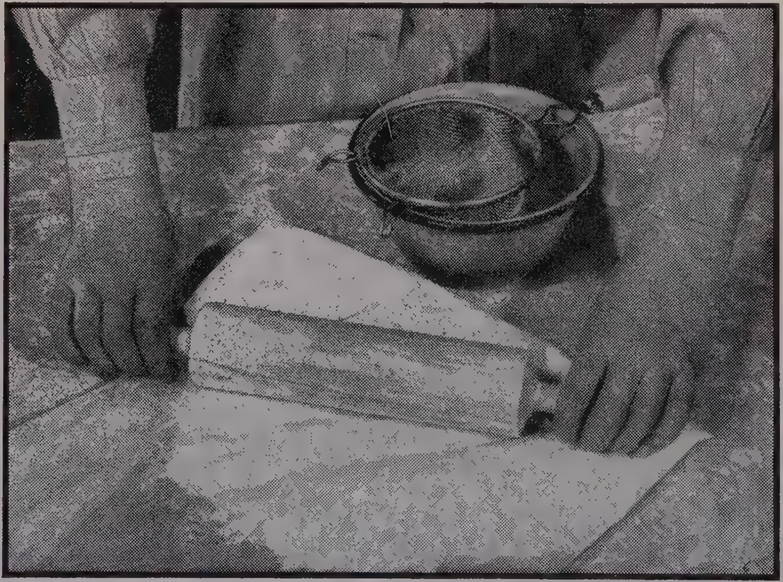
Removing Lumps from Icing Sugar



TO remove lumps from icing sugar place it in a roomy plastic bag and roll it in the bag. If a special bag is kept for the purpose, the icing sugar can be stored in it and rerolled if necessary for the next use. None is wasted or spilt if this method is used.

—ELEANOR COUSTON, Field Officer in Rural Sociology,
Department of Agriculture, Timaru

DEEP FAT
FRYING

PHYSICIANS often advise against the eating of fried foods. Children and adults with impaired health should avoid food cooked by the deep fat method, because fat is digested slowly and with difficulty. However, fried foods carefully prepared are very tempting, and although one should not make a practice of eating them, they make a welcome change. In this article Maud B. Strain, Field Officer in Rural Sociology, Department of Agriculture, Dunedin, gives recipes and methods of cooking in deep fat.

THE ideal fat for frying would be odourless, tasteless, practically colourless, and with a high decomposition point, but as this ideal medium is not available yet, the ordinary drippings collected from roasts are, when clarified, quite satisfactory. Lard fries food well, but care must be taken to prevent overheating. It smokes at a comparatively low temperature, the smoke is irritating to the throat, and the lard itself rapidly deteriorates.

Vegetable fats and oils such as cotton seed oil, when procurable, are most suitable for deep frying. They reach a high temperature before starting to smoke, they do not burn readily, and can be used over and over again. Unlike animal fats and oils, they do not readily absorb odours and can therefore be used for all types of foods and are perhaps the best fats for general use in frying.

To Clarify Fat

Fats collected in the ordinary way, a little at a time, and held in a basin or tin may possibly have small amounts of gravy or other sediment adhering to the under surface of the solidified fat. This impurity must be removed. The fat should be emptied from the container and any sediment scraped off. The fat should be heated gradually in a saucepan with a few slices of potato. The potato, being porous, gathers into its pores much of the sediment from the used fat. When the fat has ceased to bubble and the potato is browned the fat is strained through several thicknesses of cheesecloth placed over a strainer. It is then set aside to cool.

Temperatures for Frying

The temperature of fat for frying is best determined by a cooking thermometer registering up to 500 degrees F. which can be hooked over the side of the saucepan of fat.

If no thermometer is available, the temperature may be fairly reliably tested by using 1in. cubes of stale bread. The time taken to brown the bread gives a satisfactory indication of the temperature. The fat is not hot enough for any cooking until a cube of bread is browned in 60 seconds. This indicates a temperature of approximately 350 to 365 degrees F., which is suitable for small pieces of uncooked food or batters and dough. If the fat is at the correct temperature for such foods as croquettes, fish balls, and the like, the cube of bread will brown in 40 seconds and a thermometer would read 365 to 382 degrees F. The highest temperature used, 382 to 390 degrees F. for large pieces of uncooked foods, crumbed chops, and potato chips, will brown the cube in 20 seconds.

Frying at a temperature above that recommended may not only cause decomposition, or breaking down, of the fat, but has unfavourable effects on the food being fried. Potato chips may brown excessively and develop a strong flavour without becoming crisp, doughnuts may brown on the outside and yet be uncooked inside, croquettes may brown and the coating become crisp without the croquettes being heated right through, and meat may brown without cooking sufficiently.

Utensils for Frying

Utensils required for deep fat frying are listed here.

A saucepan with a moderately heavy bottom is advisable. The cast aluminium or enamel saucepan with a machined base about ¼in. thick is excellent, as the metal retains the heat and the temperature does not fluctuate markedly.

A wire basket that fits loosely into the saucepan to lift food, especially small items, into and out of the saucepan. A great convenience is a basket with two small hooks on one side near the bottom so that the basket may be rested on the side of the saucepan (see illustration on page 521).

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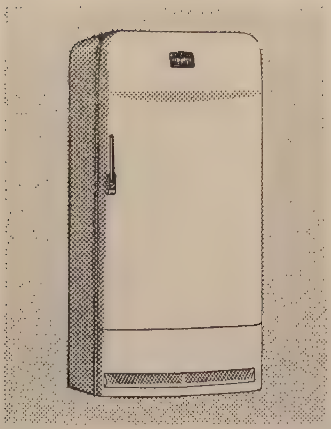

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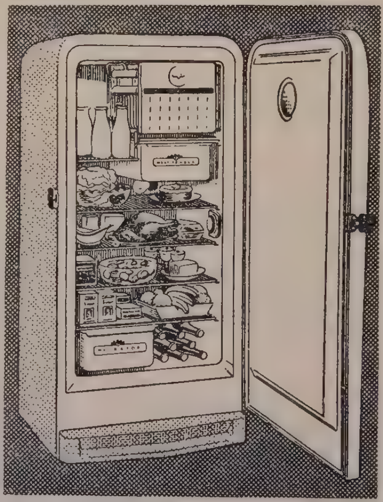

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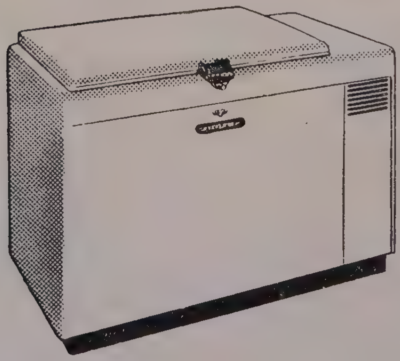

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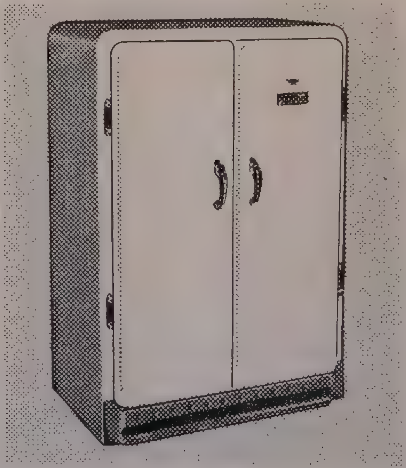

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A long-handled fork and slotted spoon for use when the frying basket is not required.

Unglazed kitchen paper crumpled loosely in a baking dish or pie dish for draining the cooked food and keeping it hot.

A cooking thermometer for testing the temperature of the fat.

Directions for Frying

The procedure described here is recommended.

1. Have sufficient fat in the saucepan to cover the articles to be fried to a depth of 1 to 2in. The saucepan must not be more than half full to allow for the bubbling that takes place when the cold food is lowered into it.

2. Heat the fat gradually to the desired temperature, 350 to 390 degrees F., according to what is being cooked, and do not let it overheat.

3. Put only moderate amounts of food into the fat at one time because (a) when the food enters the fat the moisture on the surface of the food is converted into steam, causing vigorous bubbling in the fat, and if the saucepan is not sufficiently deep, fat may overflow and catch fire, and (b) too much cold food may so cool the fat as to delay the cooking and increase the absorption of fat, thus making a greasy product.

4. When food is cooked (the colour is the best guide to this) remove it from the fat at once, drain it over the saucepan for a few moments, then turn it out on to kitchen paper and keep it in a warm place until it is served.

5. After frying is completed let the fat cool until it is safe to handle, then strain it through several thicknesses of muslin placed in a strainer. Frequent clarification prolongs the life of fat.

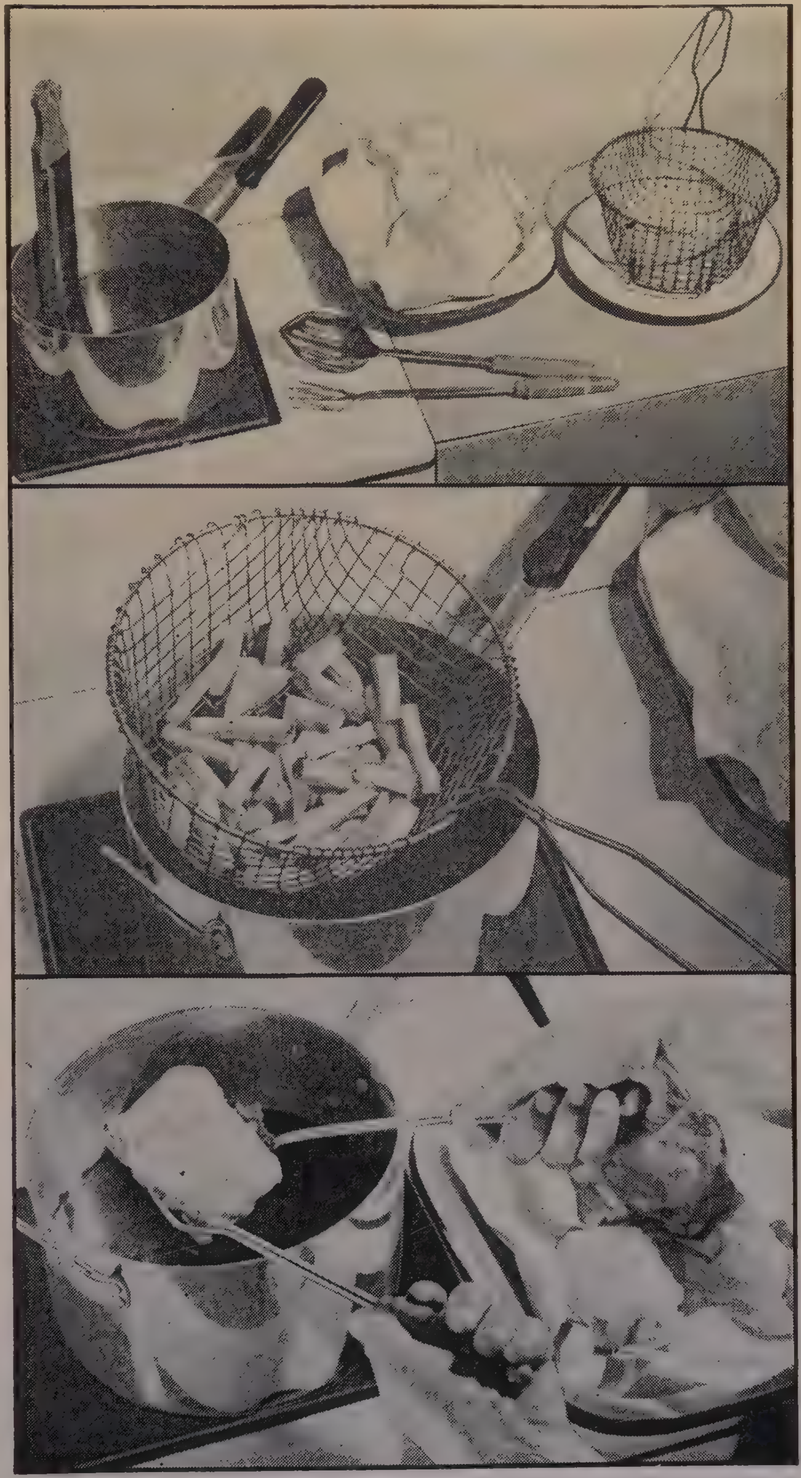
Use of Frying Basket

If a frying basket is being used in cooking potato chips, the latter may be put into the basket and lowered into the fat; if spluttering is excessive, the basket can be raised to let a little of the steam escape, then lowered again gently. This should be repeated as often as necessary, but on no account should the fat be left alone until the spluttering has ceased, in case it bubbles over and catches fire. Moist food, such as cut-up potato, should be dried on a clean tea towel or washed flour bag kept for the purpose before being put into the frying basket.

If a frying basket is being used for foods coated with batter, the basket should be in the fat and the food should be lowered into it. Foods coated with egg and breadcrumbs can be placed in the basket and lowered into the fat.

Foods coated with batter should be lifted from the batter one at a time with a skewer or long handled cooking fork, allowed to drip for a moment, and lowered into the fat. At first food sinks in the fat, but as it cooks it rises to the surface; a gentle shake of the basket will free any with a tendency to adhere to the bottom.

Food sometimes needs turning in the fat. With potato chips this is done



Utensils and methods for deep fat frying. Upper—A saucepan one-third full of fat with a thermometer in place, an enamel pie dish with crumpled, soft absorbent paper, a frying basket for holding small items, and a fork and slotted spoon, which can be used together if a frying basket is not available. Middle—The frying basket hooked over the side of the saucepan to allow the excess fat to drain away before the food is transferred to the absorbent paper. Lower—Use of a slotted spoon and fork for removing food from hot fat. This method is satisfactory for larger pieces, but is not so suitable when numerous small items are being fried.

A collection of foods fried in deep fat. Top left—Doughnuts. Top right—Apple fritters. Centre—Fish fried in batter and French fried potatoes. Bottom left—Fried tripe. Bottom right—Saratoga chips.

by raising the basket from the fat and shaking the chips around in it to expose different surfaces; with larger pieces of food turning can be done with a skewer and cooking fork.

When the food is cooked the basket is raised and drained on the side of the saucepan for a few moments, and the contents transferred to unglazed kitchen paper to absorb any remaining fat. If a basket is not being used, the pieces of food may be lifted out with a slotted spoon and long-handled fork.

Fried food is best when it is eaten immediately it is cooked; after standing it tends to lose its crispness.

Coatings for Fried Foods

Except items like doughnuts and potato chips, foods are usually coated with egg and breadcrumbs or with batter before being fried. An egg is broken into a shallow plate, two tablespoons of water are added, and the whole is beaten lightly with a fork. The food to be fried is rolled in flour or fine breadcrumbs, the whole surface being covered. It is dipped in the beaten egg and then in breadcrumbs again so that it is evenly coated. At this stage the food may be left to stand for a short time.

The first coating with flour or fine breadcrumbs helps the egg to adhere more closely to the food, and with the second lot of breadcrumbs gives density to the covering, which on contact with the hot fat is immediately converted into a resistant crust. This prevents the entry of fat into the food and the escape of anything from the food into the fat. In croquettes, for example, this crust checks the escape into the fat of the substances it encloses, more especially when the croquettes have a sauce foundation or are composed of uncooked meats or fish the juices of which are thereby entirely retained. A third type of coating is sometimes used by flouring the food and dipping it in milk and then in oatmeal or broken flaked cereal.

Recipes

Batter for Fish

2 eggs
4oz. of flour
½ pint of milk
¼ teaspoon of salt

Sift the flour and salt into a basin. Drop in the eggs and a little milk. Stir the mixture, working in the flour gradually with the rest of the milk

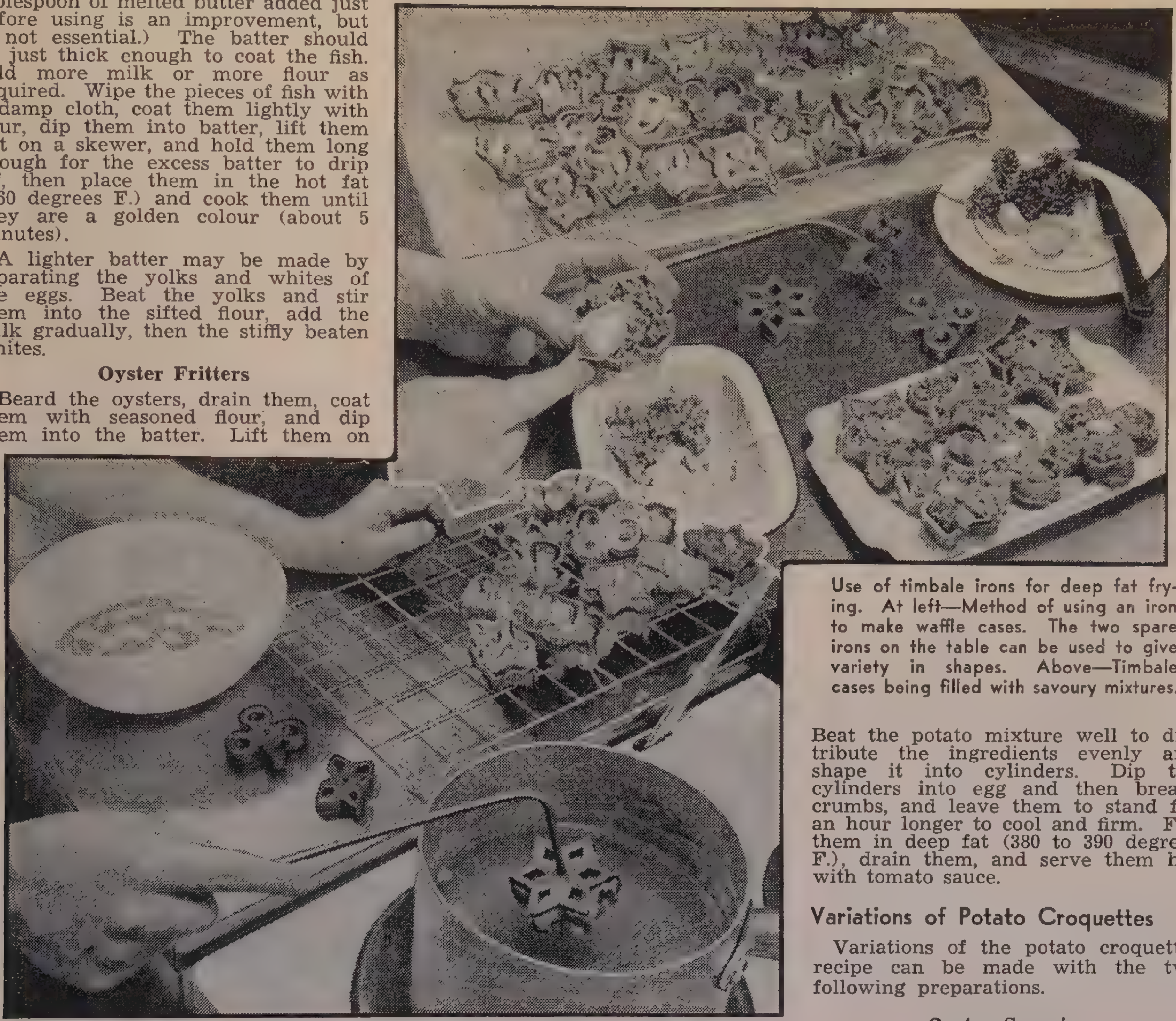
Cooking French fried potatoes (chips). The bubbling which occurs when the food is lowered into the hot fat can be clearly seen.

to form a smooth batter. Beat the mixture thoroughly and allow it to stand for an hour or longer. (A tablespoon of melted butter added just before using is an improvement, but is not essential.) The batter should be just thick enough to coat the fish. Add more milk or more flour as required. Wipe the pieces of fish with a damp cloth, coat them lightly with flour, dip them into batter, lift them out on a skewer, and hold them long enough for the excess batter to drip off, then place them in the hot fat (360 degrees F.) and cook them until they are a golden colour (about 5 minutes).

A lighter batter may be made by separating the yolks and whites of the eggs. Beat the yolks and stir them into the sifted flour, add the milk gradually, then the stiffly beaten whites.

Oyster Fritters

Beard the oysters, drain them, coat them with seasoned flour, and dip them into the batter. Lift them on a skewer one by one into the hot fat and fry them until they are light brown. Drain the oysters on absorbent paper and serve them with lemon quarters.



Use of timbale irons for deep fat frying. At left—Method of using an iron to make waffle cases. The two spare irons on the table can be used to give variety in shapes. Above—Timbale cases being filled with savoury mixtures.

Fish has a tendency to flavour fat; for this reason it is sometimes better to keep a separate lot of fat for frying fish. However, if the fish is well coated with batter before being fried, it will not seriously flavour the fat in which it is cooked.

French Fried Potatoes

Peel potatoes and cut lengthwise slices about ¼in. thick. Cut these slices again lengthwise into ¼in. strips. Dry the surfaces of the pieces between folds of a tea towel, then fry the pieces in small lots in deep fat (390 degrees F.) until they are a golden colour. Drain them on absorbent paper, sprinkle them with salt, and serve them hot. When left standing they tend to lose their crispness.

Saratoga Chips

Peel potatoes and shave them lengthwise into thin slices. (A double-bladed potato peeler is excellent for this.) Soak the slices in cold water for an hour, drain them, and dry them on a towel. Fry them in deep fat (390 degrees F.), a few at a time to keep them from sticking together, until they are golden brown. Drain them on absorbent paper. These chips can be eaten hot or cold and will keep for a week or more, needing only to be made crisp in the oven before they are served.

Potato Croquettes

1 cup of mashed potato
1 tablespoon of melted butter
Shake of pepper
¼ teaspoon of salt
½ teaspoon of chopped parsley
Saltspoon of celery salt
Few drops of onion juice
1 egg
Breadcrumbs for coating

Mix the mashed potato (warmed) with melted butter and add chopped parsley, seasonings, and onion juice (or ½ teaspoon grated onion). Beat the egg slightly and add half of it to the potato mixture (the other half, with a tablespoon of water added, is used for coating the croquettes). Beat the potato mixture well to distribute the ingredients evenly and shape it into cylinders. Dip the cylinders into egg and then breadcrumbs, and leave them to stand for an hour longer to cool and firm. Fry them in deep fat (380 to 390 degrees F.), drain them, and serve them hot with tomato sauce.

Variations of Potato Croquettes

Variations of the potato croquettes recipe can be made with the two following preparations.

Oyster Surprise

From the potato croquettes recipe omit the onion and celery salt. As each cylinder is being shaped tuck in two oysters, one at each end, re-form the cylinder, coat it with egg and breadcrumbs, and proceed as given in the croquettes recipe.

Fish Balls

To the mashed potato add ½ cup of thick white sauce, 4oz. of cold, cooked fish, finely flaked, 1 teaspoon of anchovy sauce, ¼ teaspoon of salt, and proceed as in the croquettes recipe.

Batter for Fruit Fritters

1⅓ cups of sifted flour
¼ teaspoon of salt
2 teaspoons of baking powder
2 tablespoons of sugar
1 egg
⅔ cup of milk

Sift the dry ingredients and add the egg, well beaten, and sufficient milk to make a batter just thick enough to coat whichever fruit is being used.

Apple Fritters

Core the apples, peel them, and cut them into rings about ¼in. thick. Dip

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the rings in batter. Lift them one at a time on a skewer into hot, deep fat (365 degrees F.) and cook them for 2 to 3 minutes. Lift them out with a slotted spoon and fork on to absorbent paper. Dredge them with castor sugar and serve them hot.

Peach Fritters

Peel the peaches, split them in halves, and remove the stones. Dip the halves in batter and fry them for 2 to 3 minutes. Sprinkle them with sugar.

Banana Fritters

Peel bananas and cut them in half crosswise and then lengthwise. Dip the pieces in batter and fry them for 4 to 6 minutes. Bananas require a slightly thicker batter than some other fruits, and the time required to cook them is consequently longer.

Timbale Cases

½ cup of milk
2 well-beaten egg yolks
¾ cup of flour
¼ teaspoon of salt
1½ teaspoons of sugar

Add the milk to the egg yolks and gradually stir in the flour sifted with the salt and sugar. Mix these well (the mixture should be the consistency of thick cream), cover the mixture, and set it aside for an hour. Heat a timbale iron in hot, deep fat for 2 to 3 minutes, drain it, and dip it into batter to within ¼in. to ½in. of the top of the iron. Return the iron at once to hot fat (375 degrees F.) and hold it there until the case is crisp and lightly brown. If the batter slips off, the iron is too cold, and if it sticks to the iron, the iron is too hot. A fluted iron is easier to work with than a plain one, because the case does not slip off until it is thoroughly cooked. If the cases are not crisp, the batter is too thick and should be thinned with milk.

If a thin layer only of batter adheres to the iron when it is dipped in the batter, plunge the iron in again and repeat this if necessary until there is a smooth layer; then lower the iron quickly into the hot fat and cook the batter for 2 to 3 minutes.

Timbale cases are used for sweet and savoury dishes.

For savouries fill the cases with creamed chicken, creamed oysters, or any filling fancied, and decorate them appropriately.

For sweet fillings use fresh fruit such as strawberries, raspberries, etc., or cooked fruit. Dust the filled cases with castor sugar and top them with whipped cream.

Doughnuts

3 tablespoons of butter
⅔ cup of sugar
1 egg
¾ teaspoon of salt
4 teaspoons of baking powder
1 teaspoon of nutmeg
⅔ cup of milk
3 cups of flour

Beat the egg until it is very light, beat in the sugar, then add the melted butter. Sift the baking powder, salt, and nutmeg with one cup of flour and stir these into the egg mixture alternately with the milk; add the rest of the flour to make a fairly soft dough. Roll the dough out ½in. thick and cut it in rounds with a biscuit cutter. (The type that will at the same time cut a small circle from the centre is handy but not essential.) A thimble can be used to cut out the hole if the doughnut cutter is not available. Fry the doughnuts in deep fat (365 degrees F.) for 2 to 3 minutes. Drain them on unglazed paper and dredge them with sugar.

If the doughnuts crack while cooking, the fat is too hot; if they are greasy, the fat is not hot enough.

A Steamed Pudding with Variations

By NELL MACPHERSON, Field Officer in Rural Sociology, Department of Agriculture, Auckland

A BASIC recipe for a steamed pudding which can be varied to give a number of different puddings is a great help to the housewife. The pudding can be flavoured in a variety of ways, and if each of the differently flavoured puddings has a matching sauce, a wide range of puddings is easy to make.

THE basic recipe given below is quite an economical one and is sufficient for 8 servings.

Basic Recipe

2 eggs
4oz. of sugar
8oz. of flour
¼ teaspoon of vanilla
1 teaspoon of baking powder
¼ cup of milk
4oz. of butter

Beat the eggs and sugar for 2 minutes. Add the sifted dry ingredients and fold in lightly. Melt the butter in the milk and add this mixture and the vanilla to the pudding. Turn the mixture into a greased basin, cover it with paper, and steam it for 1½ to 2 hours. Serve with custard sauce.

Variations

The following puddings are variations of the basic recipe. Recipes for the sauces mentioned are given later in the article.

Lemon-orange Pudding

Use lemon essence instead of vanilla and add half the grated rind of an orange. Serve with lemon-orange sauce.

Mocha Pudding

Add 1 tablespoon of cocoa and 1 tablespoon of coffee essence to the basic recipe and serve with mocha sauce.

Currant Pudding

Add 2 tablespoons of currants to the basic mixture. If these are put in the bottom of the steaming basin, they will give a cap effect to the pudding. Serve with syrup sauce.

Ginger Pudding

Add 2 teaspoons of ground ginger with the dry ingredients of the basic recipe and substitute 1 tablespoon of golden syrup for 1 tablespoon of the milk. Serve with ginger sauce.

Apricot Pudding

Add ½ cup of mashed, soaked dried apricots with the milk mixture. If necessary add 1 to 2 tablespoons of extra flour. Serve with apricot sauce.

Jam Pudding

Add 1 tablespoon of berry jam with the milk mixture. Serve with jam sauce.

Other variations are possible.

Sauces

Custard Sauce

1 cup of milk
1 egg
1 tablespoon of sugar
1 teaspoon of cornflour

Mix the cornflour to a paste with a little of the milk. Beat the egg yolk, sugar, and milk together and heat. Stir in the cornflour paste and cook until it thickens. Beat the egg white stiff and then pour the hot mixture over it. Stir well and return to the heat for 2 to 3 minutes. This sauce can be kept hot over hot water.

Lemon-orange Sauce

Juice of 1 lemon
1 cup of boiling water
1 dessertspoon of cornflour
Grated rind of half an orange
1 tablespoon of sugar
Sections of 1 orange

Mix the lemon juice, boiling water, and grated orange rind together. Thicken it with the cornflour and sugar mixed to a paste with a little cold water. Cook until thick and shiny. Remove the remainder of the peel from the orange and cut the sections in halves. Add to the sauce and remove from the heat.

Mocha Sauce

1 tablespoon of sugar
1 teaspoon of cocoa
1 dessertspoon of cornflour
½ cup of boiling water
½ cup of milk
1 teaspoon of coffee essence

Mix the sugar, cocoa, cornflour, and coffee essence to a paste with the milk in a saucepan. Add the boiling water and blend thoroughly. Bring to the boil and cook for 5 minutes.

Syrup Sauce

3 tablespoons of golden syrup
3 teaspoons of cornflour
1 cup of boiling water
½ cup of cold water
2 teaspoons of lemon juice

Mix the cornflour and cold water to a paste. Melt the golden syrup in the boiling water and add it to the cornflour paste. Boil for 3 to 5 minutes. Add the lemon juice and cook for 1 minute.

Ginger Sauce

1 cup of boiling water
1 dessertspoon of cornflour
¼ teaspoon of ground ginger
¼ teaspoon of cinnamon
¼ cup of chopped crystallised ginger
1 tablespoon of golden syrup
1 teaspoon of lemon juice
½ cup of cold water

Soak the crystallised ginger in the boiling water. Add the golden syrup to it and allow it to melt. Mix all the other ingredients to a paste. Add this to the hot mixture. Bring the sauce to the boil and cook gently for 5 minutes or until it is thick.

Apricot Sauce

½ cup of mashed soaked dried apricots
½ cup of boiling water
2 tablespoons of sugar

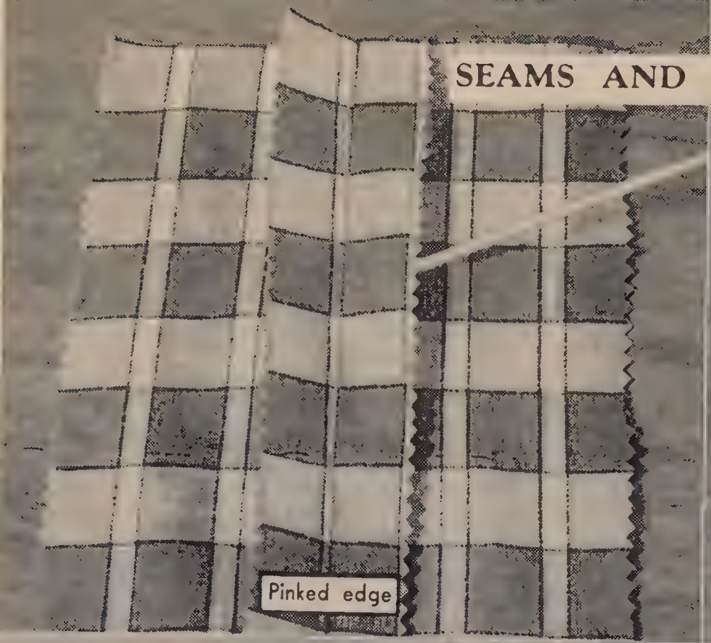
Boil the sugar and water to a syrup, stir in the apricots, and simmer for 2 to 3 minutes.

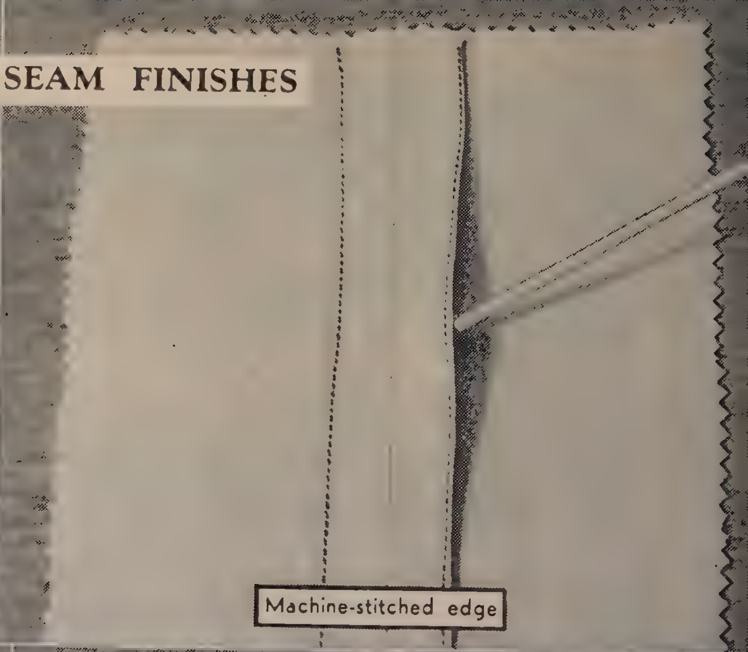
Jam Sauce

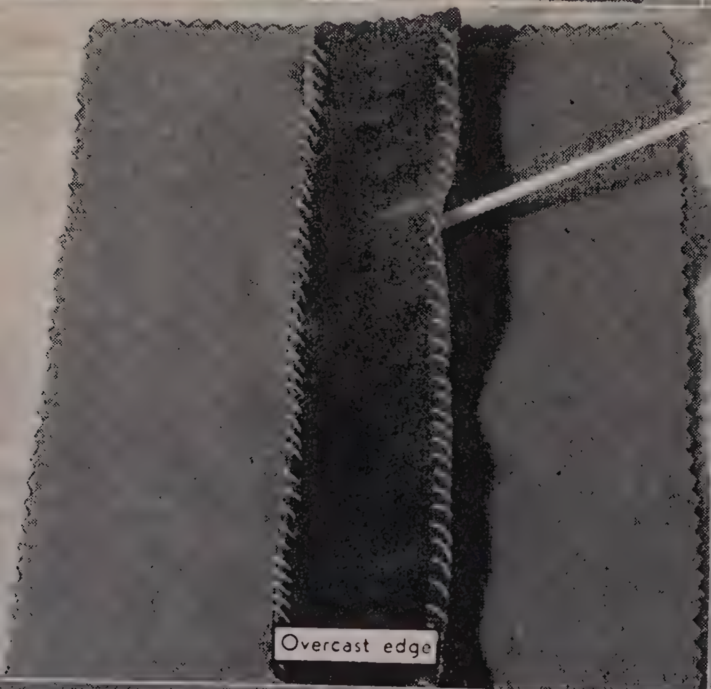
½ cup of berry jam
1 cup of water
1 teaspoon of lemon juice

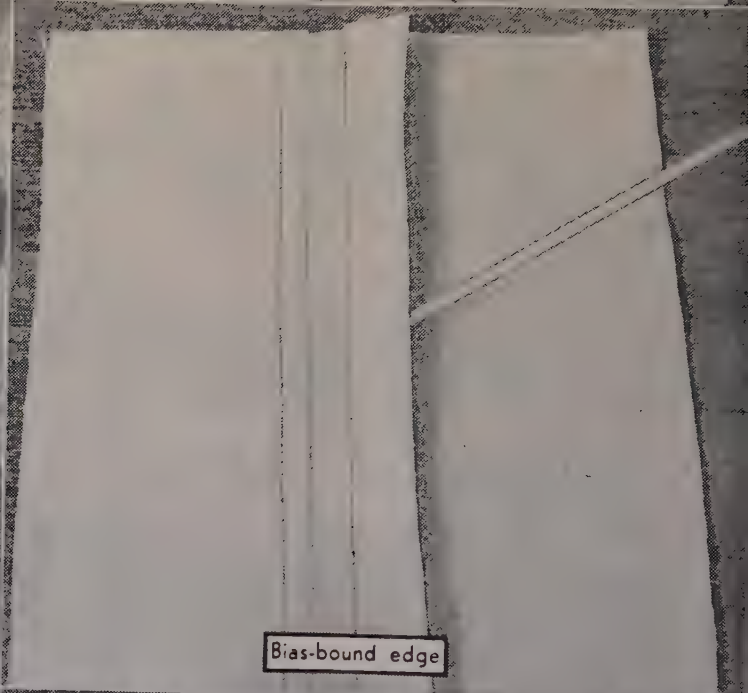
Boil the jam and water until thick, strain if desired, and add the lemon juice.

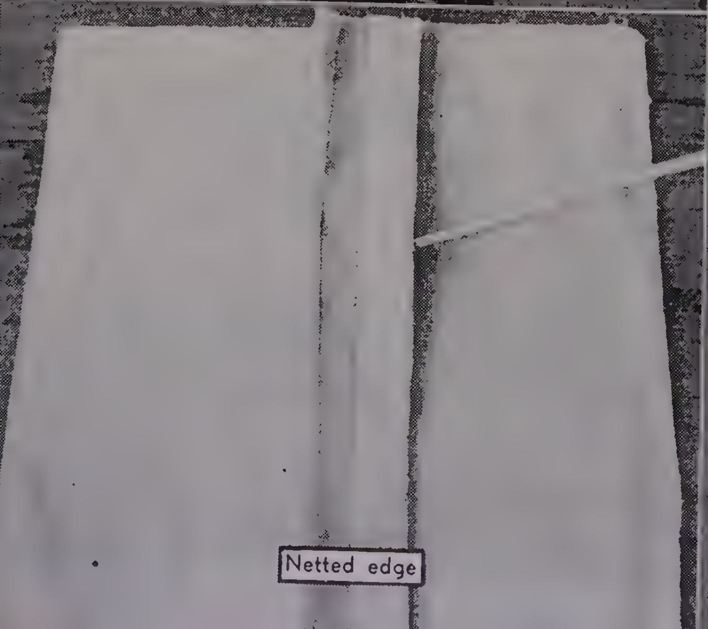
SEAMS AND SEAM FINISHES

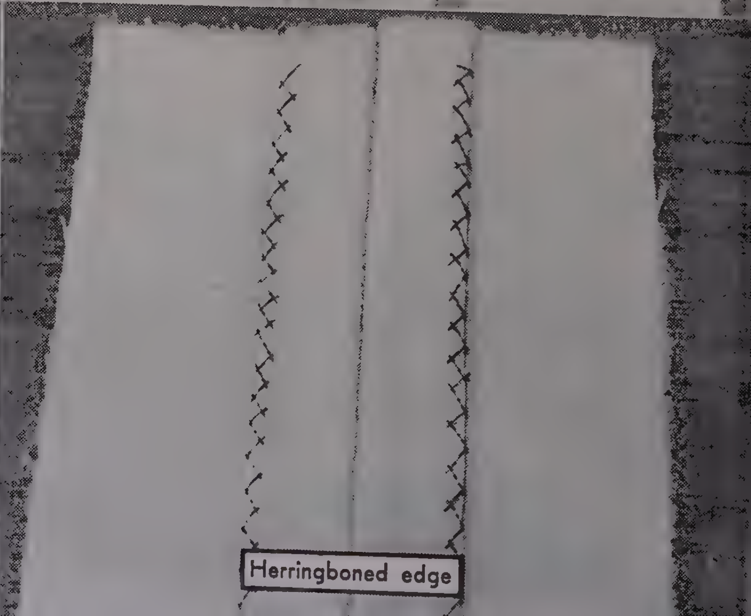

Pinked edge


Machine-stitched edge

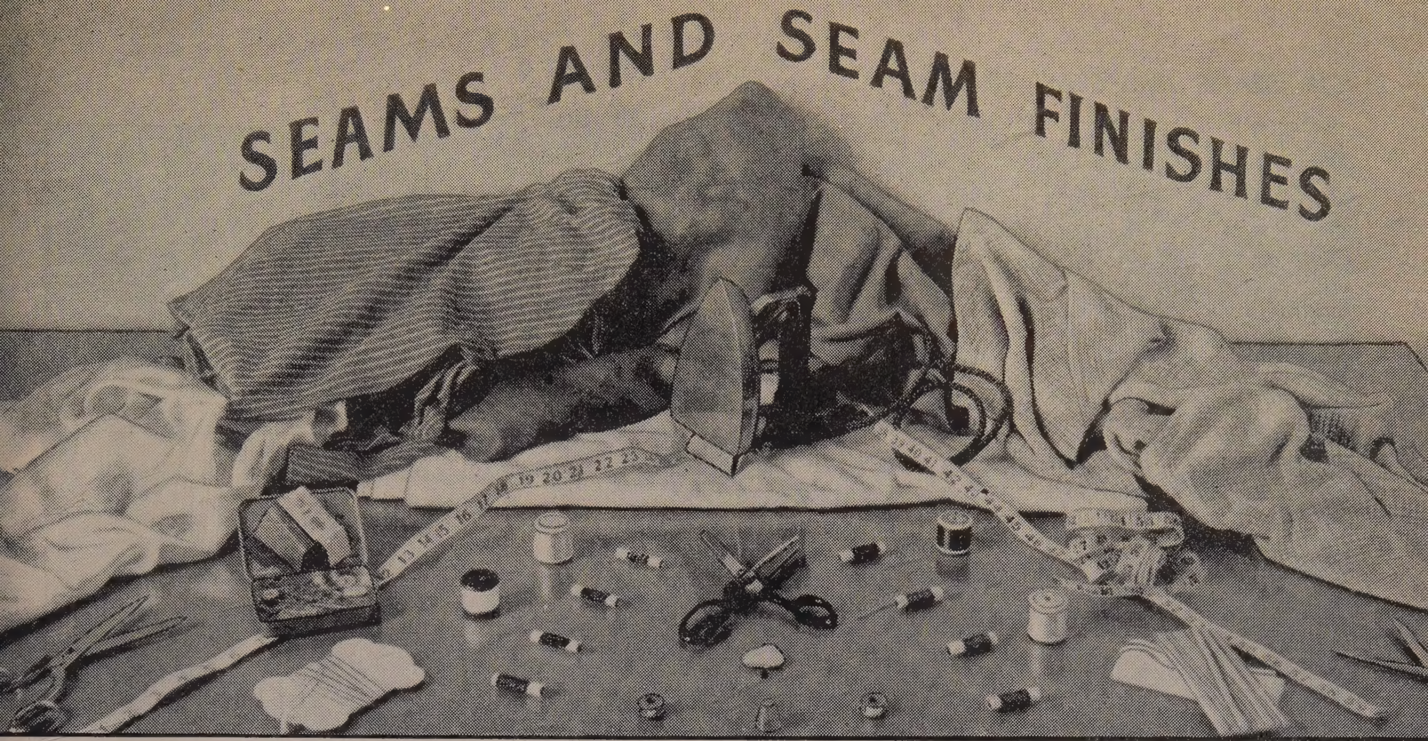

Overcast edge


Bias-bound edge


Netted edge


Herringboned edge

SEAMS AND SEAM FINISHES



By DAPHNE EILERS, Field Officer in Rural Sociology, Department of Agriculture, Auckland

THE success of a home-made garment depends on a number of factors, such as choice of material and pattern, care in placing and cutting out, correct interpretation of instructions accompanying the pattern, and the choice of seams and seam finishes used. Too frequently the home dressmaker concentrates mainly on the outside appearance of the work and tends to forget the importance of the inside finish. A well-made garment should bear critical inspection both inside and out. The seams used are dependent on the type of material to be made up and on the garment. However, there are some basic rules which must be followed regardless of the seams chosen.

CAREFUL note must be taken of the width of seam allowance given on the pattern. Most commercial patterns allow ½in. to ¾in. on all seams except side seams, where as much as 1in. is sometimes given. When thick materials are being worked (for example, coat or skirt materials) it is wise to make a guiding line with tacking or chalk to mark these seam allowances.

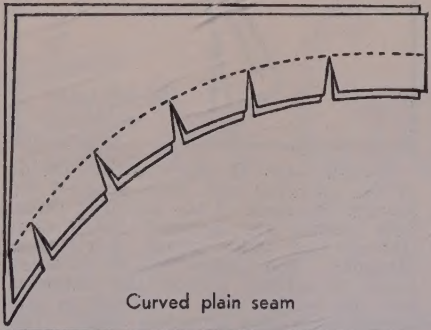
Pinning and Tacking

The experienced sewer may find it unnecessary to pin and tack seams before machine stitching them, but for the little extra time involved it is well worth it in most cases. Pins should be placed at right angles to the seam edge; they will hold the material in place more firmly and are easily removed as the seam is tacked. Where a gathered edge is to be joined to a straight one the gathered side should be held uppermost. This will ensure an even distribution of fullness. When this is being sewn on the machine the gathered side should be placed down so that the teeth of the feed can pull the gathers through evenly. Gathering stitches should be kept small. They should be done in double thread and two rows made; one just inside and one just outside the seam line. The easing along the back shoulder line should be treated in this way to allow for easy fit across the shoulder blade.

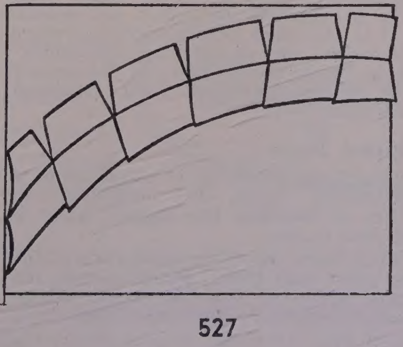
When tacking is being done it is a good practice to place the stitches just inside the line of the seam; they are then more easily removed after machine stitching. Seams should always be sewn downward and outward; for example, from waist to hem and from neck edge to armhole line.

Pressing and Finishing

After a seam has been pinned, tacked, and machine stitched the tacking thread should be removed and the seam pressed and finished before the next seam is started. This will obviate difficulties in tidying up where one seam crosses another. The iron is most important in making a neat seam and its use should not be neglected.



Curved plain seam



Plain Seam

The plain seam is used on sturdy fabrics which do not fray and where the seam will not show; for example, lined coats or jackets and on cottons or linens where the seam may be finished by one of the following recognised finishes.

Finishes for a Plain Seam

Pinking: After machine stitching has been done cut along with pinking shears and press open. This is satisfactory only on materials which are firmly woven and will not fray readily; for example, fine cottons, pure linens, and woollens except the crepe weaves.

Machine edging: The raw edges are turned under and stitched close to the turning. This finish is most suitable for cottons, linens, and rayons, but is too bulky for any type of woollen material.

Overcasting: The seam is pressed open and each side is overcast with stitches ⅛in. apart and ⅛in. deep. Care must be taken not to draw the stitching too tightly or puckering will result. When the armhole is being neatened the seam may be pressed to one side and both edges overcast together. Overcasting is an excellent finish on velvet, crepe woollens, and any material which frays readily and is too bulky for any of the other finishes mentioned.

Binding: This is an ideal finish for a material which frays easily and where a double seam is unsuitable. It is advisable to pre-shrink the bias binding by immersing it in warm water, allowing it to dry, and ironing carefully to avoid stretching. Net also may be used as a seam binding. It is satisfactory particularly on coarse linens or rayon linens which are bulky in themselves without added thickness of bias binding. The binding is tacked on to the edges of the pressed-out seam before it is machine stitched in place.

Herringbone Stitch

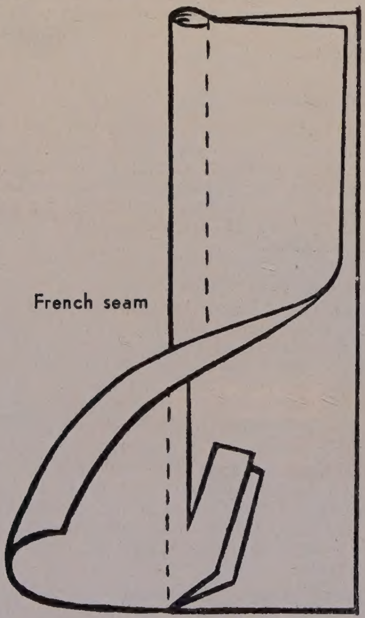
For materials which fray with constant wear and are too thick for binding herringbone is an excellent finish. It also has the virtue of holding the seam flat; for example, corduroy and some woollens.

After the seam is pressed open each edge should be herringboned to the body of the garment, care being taken that the stitches are firm but not tight enough to show on the outside or pucker up the garment.

When a plain seam is curved it is necessary for the seam edges to be clipped in at right angles to the machine stitching; otherwise the seam will not lie flat. A seam of this kind is best finished by overcasting.

French Seam

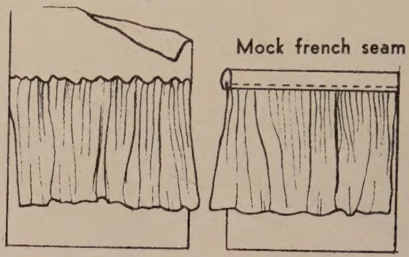
The french seam is designed for strength and to withstand frequent washing. It is of special value on underclothing, blouses, and children's clothes, particularly where sheer material or readily fraying material is used.



A plain seam on the outside of the garment is made and after trimming it down to within ⅛in. of the stitching it is then pressed to one side. The garment is then turned and a second pressing is given to form a fold along the line of stitching. Another seam is made sufficiently deep to enclose the raw edges of the first. Care must be taken when making a french seam that the entire seam allowance is used; otherwise the fit of the garment will be upset.

Mock French Seam

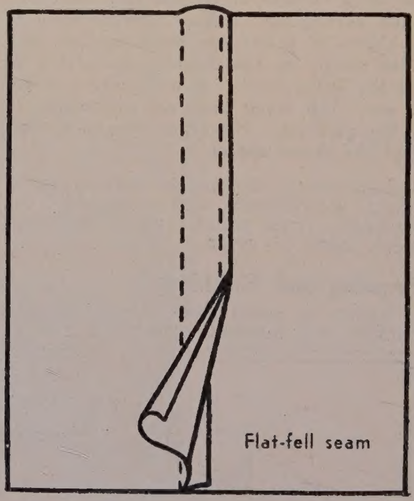
The mock french seam is most useful where a gathered edge is to be joined to an ungathered one; for example, flounce on petticoat or gathers into yoke of nightdress. Experience shows the difficulties involved to produce a neat finish if a true french seam is attempted.



The gathered edge is placed just above the line of the seam allowance of the straight piece right sides together. The raw edge of the straight piece is turned down once and then a second time to enclose the raw edge of the gathered piece. After the tacking is done one row of machine stitching will complete the seam.

Flat-fell Seam

Where a flat finish is desired and where strength is necessary the flat-fell is the most satisfactory seam. Men's shirts, pyjamas, uniforms, shorts, and certain tailored garments are best sewn with flat-fell seams.

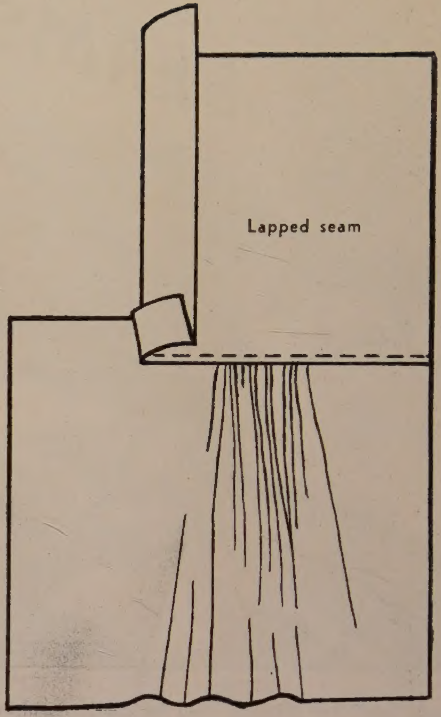


A plain seam is sewn on the outside of the garment and then pressed flat toward the back of the garment (armhole seams are pressed down over sleeves and yoke seams down over blouses). The under side is trimmed away to within ⅛in. of the stitching and the longer side is turned in and lapped over the trimmed edge. The iron is essential for really flat seams. If it is not used before tacking before the second row of stitching, the material is liable to balloon on the under side of the garment with resultant bulkiness.

Lapped Seam

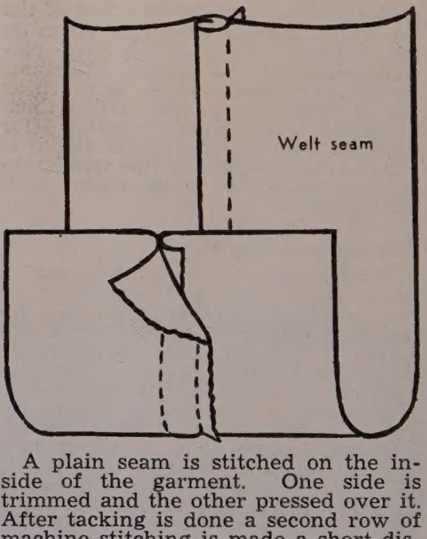
When top stitching is required as a decorative finish, for example, on yokes of blouses, the lapped seam is the one to use.

Turn back the seam allowance of the top piece and tack. Place it over the lower piece so that the seam allowances coincide. Pin and tack into position. Stitch on outside at the desired distance from the folded edge. Finish the inside by overcasting both edges together.



Welt Seam

The welt seam is similar to a lapped seam. It is used as a decorative seam where strength is required; for example, coat seams.



A plain seam is stitched on the inside of the garment. One side is trimmed and the other pressed over it. After tacking is done a second row of machine stitching is made a short distance away from the first on the outside of the garment.

Bias Seam

Difficulty is encountered sometimes when sewing bias seams, as the material is liable to stretch and give the seam a curved appearance. This may be overcome by tacking the material to fine brown paper before machine stitching. The paper can be torn off quite readily afterward.

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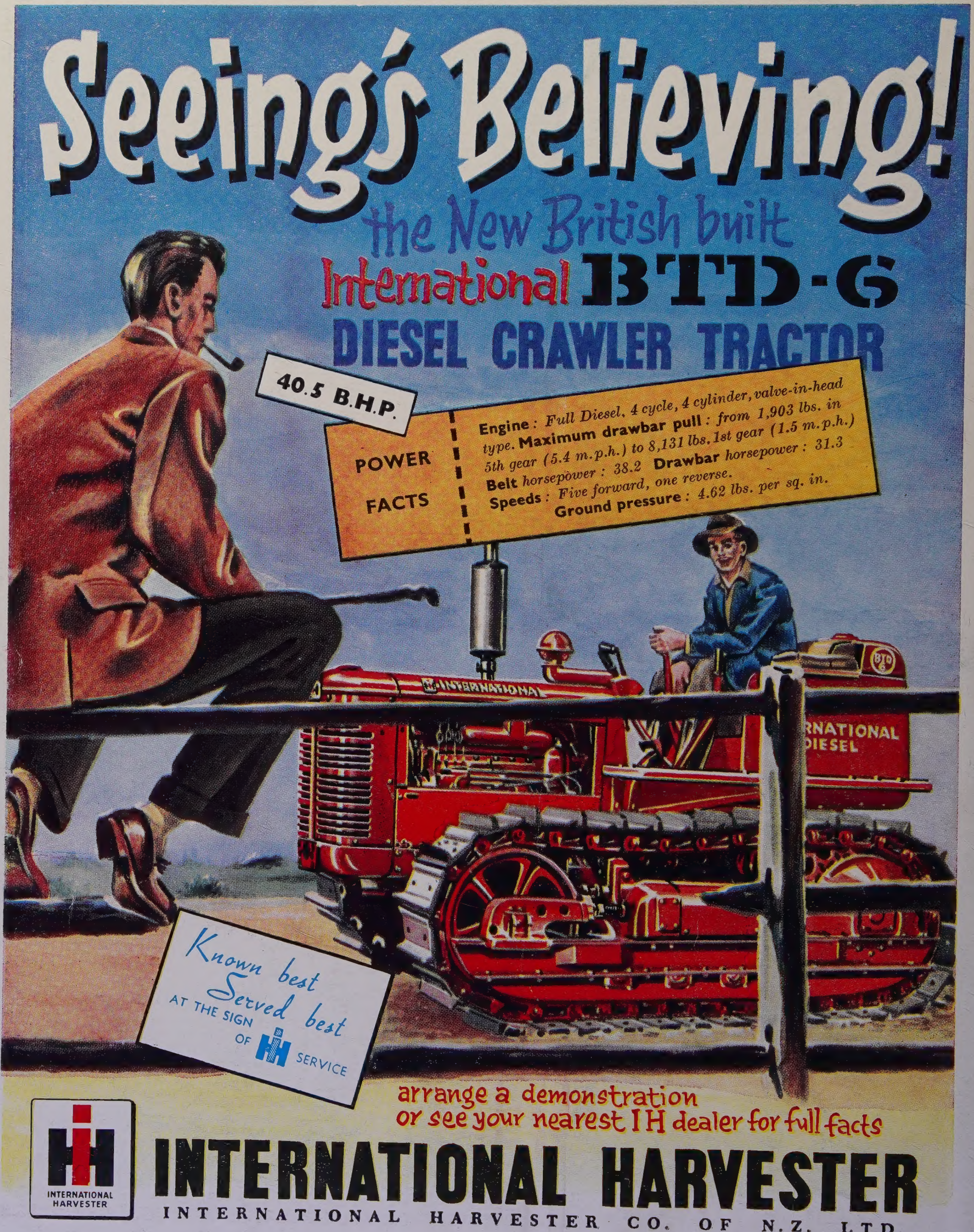
There's nothing quite like a cup of refreshing tea after a hard day's work — and when the tea is "Southern Cross" Broken Orange Pekoe, then the enjoyment is complete because this deliciously blended tea is specially packed in Ceylon for Wright Stephenson & Co. Ltd., and contains only the choicest tea buds. Homes throughout the country have favoured "Southern Cross" Tea for many, many years . . . it's so easy to order in either 5lb., 10lb. or 25lb. boxes or 60lb. half chests and 100lb. chests all specially lined to retain the utmost freshness. "Southern Cross" is the tea with a truly outstanding flavour!

CHALLENGE
ESTABLISHED 1861

Wright Stephenson

& COMPANY, LTD.



Seeing's Believing!

the New British built

International BTD-6

DIESEL CRAWLER TRACTOR

40.5 B.H.P.

POWER FACTS

Engine : *Full Diesel, 4 cycle, 4 cylinder, valve-in-head type.* **Maximum drawbar pull** : *from 1,903 lbs. in 5th gear (5.4 m.p.h.) to 8,131 lbs. 1st gear (1.5 m.p.h.)* **Drawbar** *horsepower : 31.3* **Belt** *horsepower : 38.2* **Speeds** : *Five forward, one reverse.* **Ground pressure** : *4.62 lbs. per sq. in.*

Known best
Served best
AT THE SIGN OF IH SERVICE

arrange a demonstration
or see your nearest I H dealer for full facts

INTERNATIONAL HARVESTER

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